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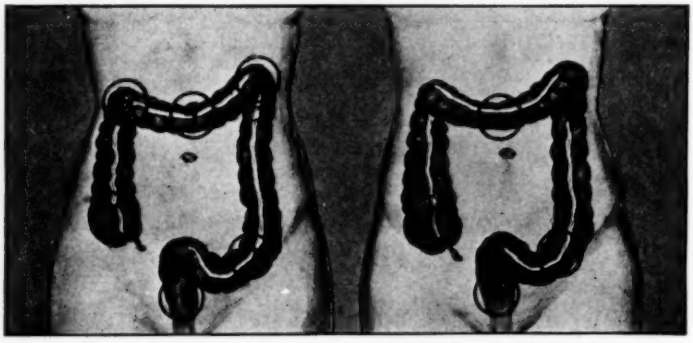

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Chemistry of the Blood*

A Clinical Review of 750 Questionnaires Sent to Urologists in the United States and Canada

VICTOR COX PEDERSEN, A.M., M.D., F.A.C.S.,
AND
MAURICE EXINER, M.D.,
New York, N. Y.

One may say that systematic chemistry of the blood is about twenty-five years old, although incidental special studies were made long before that period. The laboratory worker either as chemist or biochemist is of course greatly interested in the technical side of the question and to him must be ascribed credit for the regular and frequent discovery and thereafter for development and simplification of new methods of analysis and test. The clinician in public and private practice is chiefly concerned in the application of the more rapid and accurate of these methods of determinations which aid him in diagnosis and treatment of his cases. On the basis of clinical study for the benefit of patients one may say that in the various forms of dikney disease, urea, uric acid and creatinine are the real bases of diagnosis and prognosis; that sugar estimation is invaluable in diabetes, renal glycosuria and overactive ductless glands; that the carbondioxid combining power is an index of acidosis; and that bile pigment observations avail in more or less obscure diseases of the liver with jaundice tendencies.

Further general introduction is hardly necessary. Therefore, it is fitting to consider the more important general substances and tests in chemistry of the blood in the following order: Nitrogen (urea, uric acid, and creatinine) sugar, total nonprotein nitrogen, cholesterol, enzymes, carbondioxide combining power, bile pigments and chlorides.

LABORATORY DATA

Nitrogen.—A broad and easily comprehended and remembered classification of the nitrogens is that the protein nitrogens are endogenous and exist in the tissues in combination with the albumins and globulins. They have little or no relation with renal diagnostics. Nonprotein nitrogens, on the other hand, are exogenous because they are introduced into the body chiefly as foods and they become of considerable importance which is increasing as the time goes by in its application to renal conditions. Blood specimens are best taken twelve hours after the last meal and therefore after the absorption and assimilation of foods have reached their balance and quiescence. Observations made from blood taken at other times are very apt to be misleading.

It is now accepted among laboratory experts and clinicians that the significance of urea and the total nonprotein nitrogen excretion have so nearly the same importance for the patient that the latter test is commonly omitted because so much more difficult and expensive. Although the foregoing broad distinction is correct between protein nitrogens and nonprotein nitrogens, Folin[1] shows that urea (chiefly exogenous) is in contrast with creatinine (mostly endogenous), and uric acid (about equally exogenous and endogenous). The detail of renal permeability for these three substances will be dealt with presently. The apparent sources of nitrogen may be tabulated rather accurately as follows:

APPARENT SOURCE OF NITROGEN IN THE BLOOD.

Compound	Organ of Origin	Substance of Origin	Chemistry of Origin
Urea	Liver	Ammonia	Deaminization of amino acids; set free in digestion.
Uric Acid	Various glands of body	Amino-purines oxy-purines	Enzymatic transformation
Creatinine	Muscles	Creatin	(Metabolism—not fully understood)

It is worth while to consider briefly each of these subjects before tabulating the practice in vogue in the United States and Canada as demonstrated by the questionnaire.

*Published coincidentally with the International Journal of Medicine and Surgery.

Lately studies in nitrogen partition have extended widely to cover not only the whole blood but also the other essentials, mainly the plasma and the corpuscles. The following table after Berglund[2] is of great interest and one of the more definite additions to our knowledge.

NORMAL, MINIMUM, MAXIMUM AND AVERAGE BLOOD CONTENT OF NONPROTEIN NITROGENOUS PRODUCTS, IN TWELVE YOUNG MEN AFTER A NIGHT'S FAST

	Total Nonprotein N	Urea N	Amino Acid N	Undetermined Residual N
	M. G. per 100 C.C.			
Whole Blood—				
Minimum	27.8	8.9	5.7	10.1
Maximum	39.4	15.2	7.8	17.5
Average	32.1	11.5	6.4	13.7
Plasma—				
Minimum	18.0	9.6	4.3	1.8
Maximum	30.0	17.3	6.2	11.5
Average	24.7	12.4	5.3	6.7
Corpuscles—				
Minimum	37.7	7.7	6.7	18.3
Maximum	55.0	13.2	10.7	33.8
Average	43.6	10.3	8.2	24.7

Taken from Berglund.

The foregoing table shows the distribution of the nonprotein nitrogen group in the various elements of the blood but does not demonstrate the percentage value or occurrence of each such element. Accordingly the following table is of great interest taken from Myers[3].

COMPARATIVE NITROGEN PARTITION OF URINE AND BLOOD IN PER CENT OF TOTAL NONPROTEIN NITROGEN

Fluid	Urea N	Uric Acid N	Creatinine N	Ammonia N	Rest N
Normal Urine	85	1.5	5	4	4.5
Normal Blood	50	2	2	0.3	46
Blood in Gout and Early Nephritis ...	50	6	2	0.3	42
Blood in Parenchymatous Nephritis (Nephrosis)	55	2	2	0.3	40
Blood in Terminal Interstitial Nephritis..	75	2-3	2.5	0.5	20

Taken from Myers and rearranged to correspond with Text.

Nash and Benedict[4] state that ammonia is probably not delivered by the blood to the kidneys for excretion as such by them, but is formed in the kidneys from urea in an effort to aid excretion of acids.

In the detail of comparative excretion, Myers[5] gives the following suggestive opinion: "Judging from their comparative composition, the kidney normally concentrates the creatinine 100 times, urea 86 times, but the uric acid only 20 times." Myers, Fine and Lough[6] have pointed out that as the permeability of the kidney is lowered in conditions of renal insufficiency, this fact becomes evident in the blood, first by a retention of uric acid; second, by an accumulation of urea, and lastly by a concentration of creatinine. This indicates that creatinine is the most readily eliminated of these three nitrogenous waste products and uric acid the least readily, while urea occupies the middle ground as to excretion.

To the authors the practical application of these laboratory or chemical peculiarities is clinically that all three —urea, uric acid and creatinine—must be considered together as interrelated and as of similar origin. Hence it follows that none must be segregated as of greater importance clinically or chemically than either or both the other two. The situation in this matter is much the same as the recognized status of urinalysis. In general, one no longer fastens sole attention on one or a few elements with disregard of the other elements. Not only are the constituents of the urine allied to each other, but also must the patient himself be considered clinically after the laboratory reports are all in hand. In other words, the clinical survey of the patient is a final and binding analysis of the case.

Sugar.—The normal blood contains approximately 100 M.G. of sugar in 100 C.C. of blood—figures which are easy to remember. The rather accurate high and low normal limits are 0.09-0.12 M.G. The sugar varies in the blood without passing into the urine, and the co-called "renal threshold for sugar" is the limit beyond which sugar in the blood may not go without having sugar appear in the urine. This threshold is regarded as being as 170-180 M.G., but in healthy subjects it may be as low as 140 M.G. A "sugar tolerance test" is often invoked with benefit. After a twelve-hour fast 100 grams of glucose are administered in lemonade. If digestion permits rapid absorption of this dose, then the blood sugar ascends during the first sixty minutes to 150-160 M.G., and then during the next sixty minutes returns to the original level or to normal if the latter was the starting point. One peculiarity of this test is that patients with high tolerance show a low curve and persons with low tolerance a high curve of blood sugar. In other words, and in general, the less the tolerance the greater the concentration of the sugar in the blood.

Hyperglycaemia is the real issue and means diabetes melitus, whereas, glycosuria is only a symptom of the diabetes itself, but it may occur temporarily or otherwise in other circumstances and hence be of importance to urologists. The factors in hyperglycaemia are: 1. Intensity of the disease; 2. Diet; 3. Renal threshold.

Ranges of Sugar in Milligrams per 100 C.C. of Blood

Mild diabetes	Intense Diabetes
150—250	300—400

Naturally the renal threshold varies with the disease process. In mild cases it is low and in severe cases it is high, and in chronic cases it is low or high without assignable cause. For the urologist dealing with chronic nephritis the threshold varies and may be even 300 M.G. for considerable time before death.

It is of interest to note that sugar increases with hyperthyroidism and hyperpituitaryism, and correspondingly decreases with the opposite manifestations of the activity of these glands.

Less important than the foregoing tests and in a sense relegated to special students of biochemistry are the estimations of total nonprotein nitrogen, cholesterol, chlorides and enzymes. These will, therefore, not be mentioned again in this contribution. It is to be noted that in the general statistical tables showing returns from the questionnaire, a tendency still exists in this country to use unusual and more or less discarded tests. To the writer this appears to be clinically speaking a misfortune, because it diverts attention away from tests of real importance and therefore wastes time and energy without reaching conclusions in general conformity with the recognized tendency in all this work.

Carbondioxide Combining Power.—Blood plasma has a combining power for carbondioxide in the normal ranges of 53–75 per cent for adults per 100 c.c. of blood and 40–55 per cent for infants. A drop of 3% in adults means acidosis and a drop of 20% proves severe and dangerous acidosis. From a more general use the determination of the carbondioxide combining power is now limited to acidosis both as a diagnosis and as a guide to the administration of alkalies. A regular study of this phenomenon by Palmer and Van Slyke shows that about 15 grains of sodium bicarbonate for every 42 pounds of bodyweight raises the carbondioxide volume by 1%. As this observation is probably correct, it follows that a patient weighing 168 pounds will require 60 grains of bicarbonate of soda to raise the volume of carbondioxide

in his blood by as little as 1%. If, therefore, his acidosis were represented by a drop of 10%, he would require 600 grains of the bicarbonate of soda to restore it to normal, provided complete absorption of the soda were to occur. Nevertheless, roughly and in a clinical sense, perhaps accurately, these figures are of great importance.

Bile Pigment. It is said that the normal color of blood plasma and the serum is due to minute quantities of bilirubin. The test for added bile pigment is delicate and valuable especially in distinguishing among kidneys lesions, appendicitis and cholecystitis. The pigment augments long before the clinical signs of bile appear in the skin, sclera or urine. In general for the urologist, the bile pigment is rarely determined.

Chlorides. Examination for salt in the blood began longer ago than for any other constituent, but today the chloride test is very rarely done, not only on account of the difficulties of technique, but also on account of doubt as to the value of the determination for clinical purposes. In the whole blood the chloride content is 0.45 to 0.50 per cent, and in the plasma it is 0.57 to 0.62 per cent. Changes in the carbondioxide volume or tension in the blood on standing causes a definite preference for estimations in the whole blood rather than in the plasma. This dictum is based on the work of such authorities as McLean[7]; Van Slyke and Cullen[8]; Myers and Short[9].

The European and especially the French school led by Widall and Javal[10]; followed by Ambard[11], and later in this country by McLean[12] computed relations between retained and increasing chlorides in the blood and nephritis especially with oedema. Salt-free dietaries rest largely on these studies. Increased chloride in the plasma occurs in cardiac and renal disease and oedema, while decrease of this salt is seen in diabetes and fevers. In pneumonia decreased excretion of chlorides in the urine is always accompanied by decrease in the blood, and when the blood improves the excretion returns. This interrelation is of great prognostic value so that today the chief use of chloride estimation is as a prognosis in pneumonia.

In arterial hypertension we may have normal chloride of sodium content or occasionally higher chloride percentages, and conversely we may have increased chlorides as in normal or nearly normal tension of the blood as in nephritis with oedema. In this disease the greatest usual increase of chlorides appears while as a rule the blood pressure remains rather low or nearly normal. The original theory of Allen[13] that the sodium chloride alone is or may be the cause of hypertension is disputed by many writers after careful study such as Mosenthal and Short[14], and O'Hare and Walker.[15]

In general the following is the status of the chloride of sodium question. Estimation indicates the limits to which salt-free diet should be carried, with reference to beginning and to terminating the diet and with reference to the relative severity of the diet. Of course the smaller the change in the chloride content, the less strict should the diet be and in most patients the more prompt will be the tendency to return to normal or the actual return to normal. Establishment of the normal chloride percentage would commonly change the diet to nearly natural food. Increased chlorides are seen in heart disease and anemia of the cardiovascular diseases, in nephritis, eclampsia and prostatic obstruction among the urinary conditions and in maglignancy. A low chloride content is seen in diabetes, pneumonia, and the fevers.

Myers[16] sums up the peculiarities of chloride retention in the following words: "When cases of advanced nephritis with marked nitrogen retention are put on a restricted chloride diet it is sometimes noted that the blood chlorides drop to a subnormal level. Such subnormal figures are occasionally found in severe diabetes. A possible explanation for this is that, owing to the large amounts of urea and sugar present in the blood in these conditions, less chloride is needed to maintain normal osmotic conditions. Likewise with a sudden rise in the blood bicarbonate, there may be a compensatory fall in the chlorides."

CLINICAL DATA—RESULTS OF QUESTIONNAIRE

After casual inquiry among clinicians and pathologists in New York City, the writer came to the conclusion that there is no uniformity of blood examinations asked for by clinicians or carried out by laboratory workers without such specifications. The questionnaire method was therefore selected for the determination as far as possible of the average of usages by both groups of men. In reading over the following copy of the said questionnaire, it will be noted that the nonnitrogenous group is separated so that creatinine which should be examined for at the same time as urea and uric acid is placed in the second group of four tests on the ground that the majority of authorities personally questioned regarded it as belonging among the less important and the less frequently estimated substances. That which precedes in this contribution represents the consensus of opinion among laboratory workers and observers as shown respectively by modern text-books and recent articles. Consequently a more logical grouping for the questionnaire would have been the following, and thus probably some of the confusion in the answers would have been avoided. Substances placed in parentheses are to be regarded as the unusual and occasional tests in contrast with the other substances: I—Nonprotein nitrogen group —urea, uric acid, creatinin (total nonprotein nitrogen) II—Glychemia group—sugar, carbondioxide combining power, (blood plasma) III—Chlorides.

In all the circumstances the answers to the questionnaire were thoughtful and helpful. Appreciation of the cooperation shown by members of the American Urological Association in sending in their answers is hereby fully expressed. It is the kind of cooperation which means interest in the scientific question in hand and good-will toward the fellow-member who is endeavoring to create a conclusive study. The questionnaire read as follows:

QUESTIONNAIRE

A. Choice of Tests

1. By some pathologists a complete blood chemistry is regarded as comprising the following details:

Urea Nitrogen	Nonprotein Nitrogen
Uric Acid	Creatinin
Sugar	CO_2 combining power
Chlorides	Blood plasma pH

2. If you do not agree with the list, please indicate the selection of the substances accepted by your department as *complete* blood chemistry.
3. By some pathologists the first four tests are regarded as routine blood chemistry.
   (a) If you agree, please so state in detail.
   (b) If you do not agree with this list, please *indicate the selection* preferred by your department as *routine* blood chemistry.
4. By some pathologists the second four tests are regarded as final blood chemistry.
   (a) If you agree, please so state in detail.
   (b) If you do not agree, please note in detail the selection preferred by your department as *final* blood chemistry.
5. If blood chemistry is not done (as described in the foregoing paragraph No. 1) what in general is the form of blood chemistry adopted in your department? Diabetics are not to be considered in this question.

Please write the answer into the following columns.

Complete	Routine	Final

B. Selection of Cases for Tests

6. In your department, is blood chemistry done as a diagnostic routine on all cases of known or suspected disease of the kidneys?
7. If it is not done on all kidney cases, is it restricted to operative cases only?
8. If a complete or incomplete blood chemistry is done on the said kidney cases, is it based on a preliminary 24-hour or incidental urinary specimen before cystoscopic examination?
9. Or is it based on separated specimens of urine?
10. Or is it independent of such tests as a general background of the patient's condition? In other words, is it more or less a preliminary or a final diagnostic test?

C. Usage in Medicine and Surgery

11. In general does the Department of General Medicine in your Hospital follow the teaching of Urology as to importance of blood chemistry?
12. In general does the Department of General Surgery in your Hospital follow the teaching of Urology as to importance of blood chemistry?

The results of the questionnaire were studied by an expert statistician with the following very interesting exhibit.

A—USUAL AND ACCEPTED TESTS

Questions 1, 2, 3, 4, 5

Test	Complete Number making test	Complete % of total ques'rs.	Routine Number making test	Routine % of total ques'rs.	Final Number making test	Final % of total ques'rs.
I. *Nonprotein Nitrogen Group*						
Urea Nitrogen	106	72.1	114	77.6	42	28.6
Uric Acid	77	52.3	66	44.9	22	15.0
Creatinin	98	66.7	80	54.4	84	57.1
Total Nonprotein Nitrogen	87	59.2	69	46.9	67	45.6
II. *Glychemic Group*						
Sugar	98	66.7	95	64.6	28	19.0
CO_2 Combining Power	55	37.4	13	8.8	54	36.7
Blood plasma pH..	33	22.4	6	4.1	39	26.5
III. *Sodium Chloride*						
Chloride of Soda..	55	37.4	35	23.8	14	9.5
B—UNUSUAL AND RARE TESTS						
Cholesterol	7	4.8	—	—	1	.7
Alkali Reserve	3	2.0	3	2.0	2	1.4
All tests which have shown any value at all	1	.7	—	—	—	—
Wassermann	1	.7	1	.7	—	—
Calcium	1	.7	—	—	—	—
Urea concentrate ..	1	.7	1	.7	1	.7
Mistated	—	—	1	.7	—	—
Phthalein	—	—	1	.7	—	—
Van Slyke	—	—	—	—	1	.7
No "Routine"	—	—	1	.7	—	—
No "Final"	—	—	—	—	5	3.4
No answer	31	21.1	15	10.2	48	32.7
Total Questionnaires	147	100.0	147	100.0	147	100.0

The terms "complete," "routine" and "final" correspond and agree with the same terms in the questionnaire.

The schedule as to questions 6 and 7 tabulates as follows:

Questions 6 and 7

Number answering	Per cent of total ques'rs.	Answers
107	72.8	"Yes"—routine on all cases of known or suspected disease of the kidney.
37	25.2	"No"—not routine on all cases. Of this 37
15	10.2	Answer "Yes" to question 7—restricted to operative cases only—and
22	15.0	Answer "No"—not restricted to operative cases only.
3	2.0	Do not answer the question.
147	100.0	Total questionnaires.

The relation of the blood chemistry to incidental and twenty-four hour specimens of urine is covered by questions 8 and 9, whose answers work out as follows:

Questions 8 and 9

Number answering	Per cent of total ques'rs.	Blood chemistry tests based on urinalysis as follows:
28	19.0	24 hour.
1	.7	24 hour and 3-glass.
1	.7	12 hour.
6	4.1	24 hour *or* incidental.
24	16.3	"Yes" to question 8—(24 hour, incidental).
1	.7	"Yes" to question 8—Mosenthal.
2	1.4	Morning specimen.
1	.7	12 hours after food.
9	6.1	Incidental.
13	8.8	Sometimes together, sometimes separate.
4	2.7	*Both* together and separate.
8	5.4	24 hour or separate.
1	.7	Incidental or separate.
16	10.9	Separate specimens.
12	8.2	No relation to blood chemistry; "No" to 8 and 9.
20	13.6	No answers to questions 8 and 9.
147	100.0	Total questionnaires.

Whether or not the blood chemistry depends on the patient's general status is answered by question 10, with the following statistics:

Question 10

Number answering	Per cent of total ques'rs.	Answers
35	23.8	Preliminary
72	49.0	Final
40	27.2	No answer
147	100.0	Total questionnaires

NOTE:—Tabulated as to *Preliminary* or *Final* according to Dr. Exiner's markings in note book.

When marked on questionnaire *both* preliminary and final, tabulated under *Final.*

When marked on questionnaire *Yes,* tabulated under *Final.*

When marked on questionnaire *No,* tabulated under *Preliminary.*

What general medical and general surgical staffs are doing with reference to blood chemistry is concerned in questions 11 and 12, whose answers show the following results:

Questions 11 and 12

General *Medical* Number answering	General *Medical* Per cent of total ques'rs.	General *Surgical* Number answering	General *Surgical* Per cent of total ques'rs.	Answers
106	72.1	98	66.7	"Yes"—follow teaching of Urology
23	15.6	28	19.0	"No"—do not follow teaching of Urology
7	4.8	7	4.8	Indefinite—to some extent
11	7.5	14	9.5	No answer
147	100.0	147	100.0	Total questionnaires

It is interesting to notice that a similar questionnaire method was adopted in Europe by Rehn.[17] Rehn seems to have conducted a questionnaire himself comprising 33 clinics for urology. He sought to learn the method *always* used and the method used *off and on.* His results tabulate as follows:

Method	Routine Use	Occasional Use
Ureteral catherization	23 clinics	8
Chromocystoscopy	32	1
Phlorhidzin	7	3
Urea excretion	6	10
Phthalein	1	4
Electric conductivity	1	0
Blood cryoscopy	17	6
Urine cryoscopy	9	3

Residual N in blood	11	12
Indican in blood	1	1
Uranin	—	—
Water and concentration	17	8
Ambard's coefficient	—	—

Provocative Tests by Injection

In looking through medical literature, the following interesting provocative test of the kidney condition, by the intravenous injection of creatinin, was discovered. It seems to be the only test of this kind which has been published. Without a long record of control work, nothing can be said more than to epitomize the record of the author. R. H. Major[18] covers only the provocative test in which creatinin is injected into a vein. No previous author in this field is mentioned and the only reference made is to the provocative urea test. As a rule provocative tests have been made with dyes. The idea of these new tests is not to supplant older ones but to secure plenty of control tests to older ones and also to devise new tests to meet special conditions of differential diagnosis. Single tests unaided at best give only fractional information. Creatinin is found in normal blood and is eliminated with marked uniformity from hour to hour and from day to day in approximately the same concentration. There ought to be 20 to 30 mgms for each kilo of body weight (Schaffer's creatinin coefficient). In nephritis creatinin is retained in such a way that diagnostic and prognostic information is often forthcoming.

Technic: Patient voids urine and takes a drink of water. An hour later he passes urine which is saved and labelled. One-half of one gram of creatinin is now thrown into a vein; another glass drunk and after an hour more urine is passed; also after two hours. As a control, phthalein may be injected intravenously. It was found that in a normal man the creatinin output in the urine is greatly increased by these injections. In the specimen voided one hour later the increase was threefold; and at the end of two hours the total amount voided (in two urines) was five-fold the normal. The normal kidney can do this because it can concentrate the urine as required.

Numerous patients with various chronic diseases but without evidence of renal lesions were able to excrete urine like normal subjects, thus showing that the general metabolism was not modified by the provocative injections. R. H. Major's group of nephritics tested comprised 16 patients and the results were uniform to the degree that none of these patients was able to handle the injected creatinin. In some of them the urine creatinin showed no increase at all while in the rest there was more or less increase but never more than 50 per cent of the normal. In other words, the inefficiency of the kidneys lies in the inability to concentrate the urine sufficiently to carry off the creatinin promptly.

Review of Literature

In this country in 1922 considerable study on the relation between the kidney function and blood chemistry was done. During the following two or three years apparent apathy is shown by lack of other studies. Nevertheless, notwithstanding this seeming position of scientific complacency, there is no uniformity of procedure as the questionnaire indicates. In the group of papers published in 1922, the following three seem to be the most important. Berglund[19] seems to have contributed only one article on urology. Several other contributions bear on sugar excretion and retention. He does not consider the present status of N and other retention as it affects the urologist, but rather what is suggested in the future. The kidney is not merely an excretory organ or separator but a laboratory in which certain blood constituents are changed to urine constituents of very different nature. This seems to promise future diagnosis and prognosis, for in diseased kidneys these laboratory transformations ought to be arrested or modified, although as yet we hardly know anything about such matters. It has long been known that the kidneys transform glycocol and benzoic acid into hippuric acid and here there may be the promise of an efficiency test. Kingsbury has recently done some work along these lines.

The kidney also determines the reaction of the urine. It forms an acid fluid from the alkaline plasma. In other words, a sodium-bicarbonate carbondioxide medium is transformed to an acid mixture of phosphates in solution. We know nothing as to how nephritis modifies these transformations.

The kidney delivers end products, unutilized, of protein digestion, including certain salts, as sulphates. Thus far we know little or nothing of the excretion and retention of the latter. Again in the normal subject there is some elimination of carbohydrates after meals and unused sugars and polysaccharides escape by the urine and may also be subject to retention in disease, but of these matters we know nothing.

In regard to N retention one must consider urea, uric acid and creatinin, the latter possibly not a constituent of normal blood. Creatinin does certainly readily accumulate in the blood. Creatinin itself does not enter the urine and probably does not occur in normal blood. The upper normal limit of uric acid in blood plasma is 4 mgm. per 100 ccm. The amino-acid N for some reason shows little tendency to retention and in severe urea retention of 234 mgms. there were but 7 mgms. of amino-acid N.

The total nonprotein N in the blood in chronic interstitial nephritis may be a merely mechanical retention. In normal subjects of wealth who eat high protein meals the N in whole blood may reach 40 to 45 mgms. When these subjects are put on low protein these figures drop greatly. In other words, diet may cause a 75% increase of nonprotein N. It cannot yet be said that N retention studies have proved of use in the differential diagnosis of the various forms of nephritis.

Frontz and Geraghty[20] despite the title, devoted most of the paper to blood urea determinations, because these can be carried out rapidly and easily and are quite trustworthy under phenolphthalein control. In their numerous determinations as high as 80 mgm. blood urea to 100 ccm. blood were found in subjects in fair health. But if the figure gets up to 100 mgm. and remains there the prognosis becomes grave and the more retention the worse the prognosis. If not already present, evidence of renal inadequacy will soon appear at 100 mgm. In some of these acute urological conditions like acute suppurating kidneys the figure may go up to 250 mgm. or more yet not mean permanent damage to the kidney. This would not be the case if the condition were a chronic one. In using phenolphthalein it would not be dependable in acute conditions or acute crises because it would indicate a suppression which ought to be fatal yet is not. On the other hand it is dependable in chronic nephritis.

The only thing to be said of high blood creatinin is that it confirms high blood urea, yet with the excretory test this is not necessary. Phenolphthalein makes a good routine test because if the values are normal there is no need to go further. When values are reduced blood urea should be tested, but of the two the excretory test

is far more useful. Both conjoined are so satisfactory that there is nothing gained by estimating nonprotein N, total N, uric acid and creatinin.

The paper by Squier, Bandler & Myers[21] deals with blood determinations in 600 patients of whom about 400 were prostatics. Anteoperative tests are especially considered. The phthalein test was introduced by Rowntree and Geraghty in 1910 and since that date it has been used consecutively at the Post-Graduate with good success. It is however less representative than the blood determinations although of course these cannot replace it in differentiating between the two kidneys. The blood tests have been used since 1915 as matters of routine and record. The substances determined are urea, nonprotein N, creatinin, uric acid, chlorides and carbon dioxide. Creatinin has no significance unless there is urea retention. Even the normal kidney excretes uric acid poorly and so an impaired one means an increased retention. The normal for nonprotein N are 25 to 35 mgm. per 100 ccm. of blood, while urea N should be 12 to 15 mgm. creatinin 1 to 2.5 mgm. and uric acid 2 to 3.5 mgm. In 400 prostatics the urea N ranged from 11 to 25 averaging 18 mgm., showing some retention. Chlorides should be .45 to .50 mgm.

Thomas[22] quotes numerous figures in his paper, which appears to show that this excretory test is more trustworthy than blood determinations. However, he seems to be alone in this experience.

In the discussion of the combined papers Rowntree led off. Blood urea is the most trustworthy of all tests but at times requires to be checked up. Uric acid is the first substance to accumulate and creatinin has the greatest prognostic value as blood urea is too much under the influence of the ingesta. Of 1500 determinations at the Mayo Clinic there were 73 patients with 5 mgms. or more of creatinin and 13 with 10 mgm. or more for each 100 ccm. blood. Of this last series of 13 all but one were dead inside of 4 months. Nevertheless, exceptions can occur as in a patient who gave the large figure of 16 mgms. yet lived 18 months (it is not clear whether he died then or was still alive. P.). Engelbach stated that the dye excretory tests sometimes showed good function although the urine might be full of albumin and casts. If the dyes come through all right we never need worry. Cabot pleaded for simplicity of tests. The phthalein and blood urea are sufficient and the former will show an early partial inefficiency when blood tests are still negative. The original blood urea determinations mean nothing in themselves until after a period of treatment has intervened. Eaton of San Francisco complained that the state of the endocrines is not sufficiently taken into account in renal insufficiency tests and states that adrenalin alone can sometimes combat a high urea retention.

During the period of apparent quiescence just referred to in this country, in 1924, Rabinowitsch of Patch and Rabinowitsch[23] contributed the following valuable observations. "The urea concentration factor, known for short as 'U.F.C.' is the ratio between the urinary urea and blood urea concentrations. It is conventionally, in the normal subject, about 41. The urea concentration in the urine is a familiar subject and in the normal man amounts to 2% and upwards. The relationship between urea concentration and renal insufficiency is well known, but this normal minimum is not well suited as a guide to the functional state of the kidneys. It is known as the 'casual concentration' and is inferior in importance to the maximum urinary concentration of urea. This can be determined only in connection with special plans of feeding, including feeding with urea. This line of study originated with Ambard, who in his first efforts cut out salt from the diet, limited water intake and gave urea by the mouth; later he modified this and fed the patient on sweetened milk curds without water for two days, allowing sips of water on the third. By the third or fourth day there was a maximum concentration of ureau in the urine of about 5.7%. This test is used extensively in France but not in the English-speaking countries for it takes much time and imposes the risk of too much work on diseased kidneys.

"MacLean and de Wesselow modified Ambard's method. They found patients with diseased kidneys were unable to concentrate urea when fed urea in large amounts. The test patient is supposed to take 15 grams of urea in 100 ccm. water after abstention from fluids and the urine is collected one and two hours after ingestion. The present authors took up this test with some variation. The evening before the test the patient fasts including deprivation of water. Urine passed at 6 the next morning is thrown out and urea is then ingested, 15 gms. in 100 ccm. water. The patient now voids urine at 7:00 A. M. and 8:00 A. M. for testing the urea concentration. Originally there was no thought of combining blood urea concentration with urinary urea concentration. The latter was merely determined by the Van Slyke method. Later the authors combined the two as already described.

"In England for some time both percents have been taken into consideration in diagnosis while in France the Ambard coefficient is extensively employed. In the United States we have been using blood urea and the phthalein excretory test. The U. F. C. is superior to the latter, of which it is a rival. The phthalein test shows much variation and is sometimes negative when the kidneys are in good functional state. Of course there are some forms of nephritis in which the functions of the kidneys is not compromised, and then no test can have any value."

Notwithstanding all the studies through the years, the exact nature of uremia remains unexplained. Among the more modern papers of value seeking to reach the pathogenesis of uremia is the Wood's Reference Handbook of 1916, in which the following discussion by Woodward will be found: "It is of some interest to note that even as late as this date there is no mention, under diagnosis and prognosis of nephritis, of percentage figures of blood urea, and total nitrogen nor of tests of renal inadequacy. Van Noorden is said to recognize the existence of uremia in which nitrogen retention is quite absent, although only one case is mentioned. The theory of Ascoli that the degenerated kidney secretes a toxic substance is mentioned. Injections of extracts of such kidneys set up albuminuria in the sound kidney but apparently not nephritis. As has long been known uremia cannot be induced by injecting any amount of urea, sodium chloride nor any other substance known to be retained in the blood in nephritis, and double nephrectomy in animals, ligation of both ureters, etc. also fail to produce it. Fischer's theory that uremia amounts to an acidosis of the tissue-colloids and is therefore a purely physio-chemical problem is also mentioned. Uremia may be explained by oedema of the nervous centers. (Strauss, however, calls attention to the fact that oedema of the brain occurs without the production of uremia). Woodward and Fischer are both Cincinnatians, which may explain why the former makes extensive use of the latter's teachings under pathology and treatment and gives little space to the views of others.

Fischer evidently attaches so little importance to sodium chloride retention that he combines it with sodium carbonate in his solution which is used in all threatened

or actual uremic crises. The carbonate and also the citrate are intended especially to combat acidosis while the sodium chloride combats the tendency of the colloids to swell. Woodward gives the solution by mouth, by rectal drip and by intravenous injection and testifies as to the powerful diuresis produced. This use of the chloride seems to antagonize the use of the chloride-poor diet of Widal in nephritis with oedema. The full formula of Fischer's solution is sodium carbonate 10 to 15 grams; sodium chloride 14 grams and water 1000 ccm. It may advisedly follow venesection. When up to 20 ounces of blood have been abstracted Woodward injects up to a liter of Fischer's solution. The latter should never be given hypodermatically.

No mention is made of Strauss's hypertonic solution of glucose in this connection although it was introduced many years ago. Likewise it is directed apparently against a supposed acidosis. In addition to the sodium carbonate in the solution various other alkalies are used against the acidosis notably citrate of soda and any fruit which contains citric acid, acetate of potash, bitartrate of potash and sodium benzoate. By giving citrate of caffein we can kill two birds with one stone as caffein and other cardiac stimulants are strongly indicated.

All these alkaline salts also fill the double indication of antagonizing the acid in the colloids and the tendency of the latter to swell and cause oedema. Heart stimulants are not given alone to strengthen a weak heart and avert fatal collapse, although this indication may be present. Even if there is no sign of heart failure stimulants are needed to force blood through the kidneys.

Woodward calls attention to the division of opinion in oedematous cases as to whether sodium chloride and abundant water should be given or withheld. Both factions claim good results.

H. Strauss[24] the well-known medical urologist of Berlin makes some statements of interest. In common with Widal, Volhard, Reiss and other well known medical urologists, he believes that convulsive uremia is an affection distinct from true uremia. The former he terms "nephrogenic eclampsia"; it is very largely a complication of acute nephritis. True uremia is seen chiefly in chronic nephritis. Whether we make a third form—angiosclerotic uremia, depends on the point of view. Research of the past 15 years has shown that in uremia not only urea but other bodies, as creatinin and indican, are retained in the blood. He does not accept entirely the view of Widal that convulsive uremia is due to retention of chlorides, nor the dictum of Volhard that it is the result of increased tension of the cerebrospinal fluid. The latter is merely the old mechanical theory of Traube in new form. He does not accept these hypotheses simply because both retained chlorides and increased intracranial tension may occur without the production of convulsions. True uremia is best treated by disintoxication and heart stimulants and venesection is the best way to secure the former; but venesection does not lessen the retained nitrogen in the blood. After venesection the author injects glucose solutions. The convulsive form cannot be treated without the use of narcotics like luminal and morphine or papaverin.

Arnaud, Henry and Moulierac[25] do not refer to clinical uremia but to postoperative and posttraumatic increase of blood-N which occurs oftener than not. Counting 0.45 gm. per 1000 as normal the increase may be anywhere up to 1:15. Its relation to postoperative acidosis is not stated.

Olmsted and Caulk[26] it should be carefully noted consider only nonprotein N in their paper, otherwise the figures will seem strange. Test subjects of the staff of Barnes Hospital, St. Louis, were first tested for the normal output, both on ordinary and high protein diet. The latter made a difference of about 5 mgm. daily to 100 ccm. of blood. Ordinary diet range was 28 to 38 mgms.; with high protein 33 to 45. Folin has placed the range with ordinary diet as 25 mgms. to 38. We should not speak of retention until the figure is at least 40.

Medical chronic nephrites vary notably from surgical cases. In the former much kidney tissue is destroyed but in the latter the insufficiency may be purely functional so that problematic recoveries often take place.

In 800 blood tests at the Barnes Hospital during past year the nonprotein N was always determined and in 100 of the patients the figure was 50 or more mgm. which means certain retention. The urological patient, as stated above, has an astonishing power of recovery and clinical experience is confirmed by animal experiment. In the latter this power may be manifest after months of badly crippled function but in the clinic unless the blood values become normal within one month they probably never will.

Infections and intoxications can both badly depress the kidney function and if the latter originates from disease of one kidney the state of retention acts unfavorably on the sound kidney. But simple loss of one kidney may not lead to retention. Man uses only about 1/7 of his kidney tissue for ordinary daily excretion.

Lemierre, Deschamps, and Bernard[27] sum up the history of a case as follows: Patient was a plumber aged 28, admitted to the hospital in a state of somnolence—no history obtainable. He died at the end of 48 hours of acute progressive coma but with some symptoms quite atypical. He had been under treatment for lead colic which aparently was an error in diagnosis. First symptom a profuse diarrhea and this was succeeded after some three weeks by the cerebral symptoms. Arrived at the hospital, 300 C.C. of urine were drawn with some albumin. Diarrhea had been succeeded by vomiting and colicky pain, motor restlessness and stupor which passed into coma as aforesaid.

The diuresis of the patient increased and while in the hospital he passed several liters daily, low specific gravity, some albumin. His blood urea was at the first tests 5.30 gms. per 1000, increased before death to 6.46. Save at the time of admission there had been no failure of diuresis and this had not been marked when we bear in mind the facts that there had been profuse diarrhea and not much liquid ingesta. During the last 24 hours in the hospital he excreted 3 liters, and the last catheterization brought away 600 ccm. Remarkable was the normal or somewhat deepened respiration with no suggestion of Cheyne-Stokes—about 22 per minute. Also the subnormal temperature of 35.5 C. These two particulars are both found in diabetic coma, which is probably why the authors injected some insulin in the hope of reaching results. Autopsy showed kidneys entirely normal, the microscopic examination also proving negative.

The authors endeavor to throw some light on this case. In 1919 Ameuille showed that in fatal acute nephritis it is not uncommon to find the kidneys still apparently intact. The condition is the result of some infection which will be discussed later. Lead colic is eliminated from consideration altogether. Before the Society of Biology in 1920 Laudat showed that N retention is practically always urea retention, a claim also made in 1906 by Widal and Ronchese. That is, urea in the blood may be present in 15 times the normal amount, while residual nitrogen in the same patient may be only

(Concluded on page 286)

Bismuth Treatment of Syphilis where Arsenic Fails

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Since bismuth was first advocated in Europe, I have used it extensively, not only in cases of newly acquired syphilis, but in a number of old cases with great satisfaction. The following clinical reports refer exclusively to stubborn cases which have been treated previously for years with mercury, arsenic and iodides without obtaining Wasserman blood and spinal fluid negative reactions and which showed evidences of latent or active luetic manifestations.

Thirteen cases were purposely selected from our private index files rather than from institutions, because of the difficulty of following up patients who wander from clinic to clinic. All had positive Wassermans and had received from others or from us, several series of treatments with arsenical derivatives, mercury and iodides. After trial with several of the commercial suspensions of bismuth recommended for intramuscular injection, the most satisfactory proved to be X-iodo-bismuth, a loose combination of bismuth iodid with quinin suspended in sterile sweet almond oil, not because it contained a high percentage of metallic bismuth, but because, in our experience, it had never caused pain, indurations, a blue line over the gums, symptoms of intolerance, diarrhea or renal irritation and patients all appeared to improve clinically after a short time. This we attribute to the rapid clevage of the complex bismuth molecule in contact with the alkaline muscle tissues and the production of anti-bodies which affect the spirochete in some way as yet unknown. French authorities recommend bismuth on this account in neuro syphilis.

Case 1. W. T. Age 65; male; contracted syphilis in 1917 during the war. His primary sore did not show any spirochetes on one examination and his physician lightly pronounced it a non-specific lesion. He first came to me in 1922 for a hematuria and prostatic trouble. He had Argyle Robertson pupils and symptoms of G. P. His blood was 4 plus. It was an advanced case with gastric crises and little could be expected from any treatment. He was given several series of small doses of silver-arsphenamin and neo-arsphenamin without much improvement and discontinued treatment for 6 months. In 1924, patient returned and received x-iodo-bismuth intramuscular injections twice weekly with much benefit and was feeling better but discontinued treatment and went to the country. Wassermann was still 4 plus. Unfortunately, I did not see patient again. He was later taken to a hospital without my knowledge by his family, and died.

Case 2. I. Z., age 40; male. history of infection 20 years previously; treated almost continuously since with internal medication and intravenously with arsphenamin. Spinal fluid and blood Wassermann were always positive. Patient was almost blind in right eye and could only faintly distinguish objects with left. After two courses of bismuth, he recovered his sight sufficiently to obtain employment. Blood became negative. He then disappeared.

Case 3. I. W., age 40; female, history of several miscarriages; patient's husband was infected before marriage 30 years previously and was treated for years for severe tertiary manifestations. He came to me in 1918 and was finally cured. His wife had received no treatment until 1918; her blood was then 4 plus. She was given almost continuous treatment with uercury, iodides and the arsphenamins, but her blood remained positive. She was a big woman and her general health did not seem to be affected, but blood pressure was very low (90 Systolic) and she always felt tired and weak. Two series of bismuth injections brought about a negative Wassermann, which has remained permanent for 8 months (to date); blood pressure has also improved.

Case 4. J. C., age 39; male; contracted syphilis 8 years previously. After several series of arsphenamin, mercury and iodides in clinics the Wassermann remained positive. He began x-iodo-bismuth injections June 17, 1924. On November 16, 1924, and again March 8, 1925, he was negative, but in August, 1925, it was 1 plus Wassermann. His general health was good. He is now receiving a second series of x-iodo-bismuth injections and is negative.

Case 5. A. L., age 33; male; contracted lues 10 years previously. Has received arsphenamin treatment on and off ever since. In 1922 I gave him arsphenamin, mercury and iodides until May, 1924. At that time blood was still positive; in February, 1925, after a series of x-iodo-bismuth injections, he became negative, but in April, 1925, he had a Wassermann "doubtful." After a second series of bismuth injections he is now negative.

Case 6. E. L., age 36; male (brother of Case No. 5); infection occurred at the same time and was treated in similar manner; patient, however, developed symptoms with gastric crises and severe constant headaches, in spite of all treatment. After 20 injections of x-iodo-bismuth, his blood remained 4 plus (Oct. 20, 1924). He refused spinal puncture. Another series of bismuth injections which was completed April, 1925, showed the blood doubtful; but all tabetic symptoms had disappeared and he felt very well. After a third series he became negative.

Case 7. G. C., age 46; male; contracted lues 14 years ago, neurotic type with tabetic tendency—complains of weakness, numbness of limbs, eyes react very slightly to light, low blood pressure. Arsenic injections with mercury and iodides. Wassermann negative since 1923, but without improvement as to general condition. Was given a series of x-iodo-bismuth with much benefit. Since August, 1924, he has had no further treatment and remains well but still has low blood pressure (98 systolic).

Case 8. N. L., age 32; male; contracted lues during the war (in France); treated in U. S. Army but came to me on June 10, 1924 with a 4 plus Wassermann. He was given alternately, every third day, intravenous arsenic and x-iodo-bismuth intramuscularly. On September 22, 1924, his Wassermann was doubtful and bismuth injections were continued alone twice weekly. On October 28, 1924, his blood was 1 plus and he only received 5 more bismuth injections. Repeated Wassermann since then have been negative and patient has remained in good health until July 28, 1925, when his blood was 1 plus; a further series of bismuth is now being given.

Case 9. G. L., age 26; female (wife of Case 8); infected by her husband in 1919, had no treatment until May 12, 1924; miscarriages, headaches, ulcerated tonsils, salpingitis (L), Wassermann 4 plus. After 10 neo-arsphenamin intravenous injections blood remained positive. This was followed by 20 x-iodo-bismuth injections and on October 28, 1924, she was Wassermann negative and felt well. Monthly blood tests since have been negative to date.

Case 10. S. G., age 28; male; congenital luetic, notched teeth, fissured tongue, unequal pupils; patient superinfected in 1916; scar on prepuce—Wassermann positive. Treated while in U. S. Army and in various clinics with mercury, iodides and arsphenamin. He was apparently well, although Wassermann was occasionally positive. He married at this time and ceased treatment. In December, 1923, patient had a serious relapse with severe cerebro-spinal manifestations, headaches, diplopia, emaciation, weakness, rapid pulse, melancholia alternating with great exhaltation excitement and other mental symptoms of G. P. His relatives consulted various physicians and one of them did a spinal puncture which seemed to affect the patient adversely. He consulted me again and received every third day alternate intravenous injections of small doses of neo- and silver arsphenamin and tonics with special attention to his gastro-intestinal condition to which his dizziness and fetid breath may have been due. There was some improvement, but he still had paretic symptoms, vomiting after food and the emaciation became very marked. He had lost 35 pounds in 6 months. On December 18, 1924, silver salvarsan intravenous injections alternating with intramuscular injections of x-iodo-bismuth were given with gratifying results. He regained his lost weight, felt well and was less excited and by July, 1925, was more normal mentally; nevertheless it was evident that the progressive G. P. condition was not competely arrested. His general health and rapid pulse which had been about 140 per minute when speaking or under any excitement, was now from 85 to 95; his color and muscular strength was good—he weighed 165 lbs., and was sent to the country for complete absence of any excitement. When last seen (Aug. 30, 1925) he was, as he expressed it, 'quite fit" and has begun a further prophylactic course of bismuth injections.

Case 11. H. H., age 55; male; cerebro-spinal case; infection dated back over 35 years. He had received irregular treatment (inunctions and internal medication with mercury). In 1919 he had a 4 plus Wassermann, severe headaches, gastric crises, rapid pulse, Argyle Robertson pupils and dim vision. He received over 40 arsphenamin intravenous injections, alternating with periods of rest, mercury and K. I., but without much improvement; blood was always positive. Patient would not consent to intra-spinal treatment; moreover the clinical evidence rendered a spinal puncture superfluous; the headaches were especially troublesome. A son died at age of 18 (insane), evidently a congenital luetic; wife had lues, but refused treatment. On February 11, 1925, he began a series of x-iodo-bismuth injections. These were continued until June, when he went to the country. In this short time there was marked improvement in the clinical symptoms; patient said he felt perfectly well and had no more headaches. Blood Wassermann was negative.

Case 12. A. P., age 50; male; no clear history of infection, no scar on genitals, but the irregular hair line, notched teeth, and facies suggested a congenital syphilitic origin, although he believed he acquired it at age of 24. He refused spinal puncture. Blood was occasionally positive but generally negative. From 1912 he received mercury. iodides and from 1916 arsphenamin injections. He complained, in spite of all treatment, of dizziness, diminished vision, sensation of frontal compression. The eye reflexes and knee jerks were diminished. Patient received at irregular intervals, beginning November 1st, 1924, injections of 2 c.c. of the x-iodo-bismuth suspension in oil until March 16, 1925, by which time the frontal headaches which had been so distressing, had entirely disappeared, and he was feeling so well that he discontinued further treatment. Blood Wassermann negative.

Case 13. C. B., age 40; male, with vague history of infection; scar on prepuce, blood 4 plus. His chief complaint was inability to work on account of an osteo-arthritic thickening at the r/ankle which did not improve under the arsphenamin, mercury and iodides. Treated previously, in several clinics. He was a troublesome alcoholic patient, always complaining. I sent him to an orthopedic institution to see what could be done to help his foot, with mechanical appliances, with some benefit. Blood Wassermann remained 4 plus. In June, 1924, I began the bismuth treatment and K. I. and he improved greatly after only 14 intramuscular bismuth injections. The enlarged joint was so diminished in size, and the pains in the leg no longer troubled him. He returned to his work as a waiter and has not appeared at the office since.

Conclusions

From these and a number of new and old cases treated, I feel that we have in x-iodo-bismuth (and for that matter probably in other bismuth preparations) a spirocheticidal agent which if not quite as rapid in healing primary lesions as arsphenamin and its derivatives, is more permanent in its cure of syphilis. It is certainly superior to mercury, and is especially convenient to use in children, the aged, the weakly and patients who do not tolerate arsphenamin or in cases which the veins are difficult to find or so small that the nervous excitement brought about by the dread of intravenous injections, renders it undesirable. Here we have an equally efficient spirocheticidal means of treating such patients.

As a prophylactic measure against recurrence in newly acquired infections it should be used on general principles, alternating with arsphenamin intravenous injections every third day.

While it is far too early to make any positive statement as to whether this will protect the patient or whether any treatment protects the patients against the cerebro-spinal invasion of the trepenoma pallida later in life, it is worth a trial, for in all new cases treated by me on these lines I obtain negative Wassermanns and clinical cures without relapses or any suggestion of cerebro-spinal sequences.

In old neglected cases, or those which have been treated for years by the older methods, we have not always obtained Wassermann blood negative results, but all patients were clinically improved and many became permanently blood negative, which was not the case during the years they had been treated with arsphenamin, mercury and iodide.

188 Market Street.

The Doctor of the Future a Health Counsellor

"The medical schools of many countries, especially, perhaps, those of North America, Great Britain and, to a less degree, Western Continental Europe, are facing several problems of curriculum, of teaching methods, of purpose and of aim. An American committee has been formed to examine the course of study in the United States and to recommend changes. This committee will be expected to find answers to such questions as these: What kind or kinds of doctors ought the medical school to turn out in response to the needs and demands of the public? What should graduates know and be able to do? How best can they be helped to master this knowledge and skill? How can they be given the right attitude toward their work?

"Probably three-quarters of all doctors today are general practitioners, that is, physicians whose aim it is to recognize diseases, to deal with all the more common maladies by advice and treatment, and to know when to refer patients to specialists. This general practitioner is at present facing many difficulties. The specialist tends to monopolize prestige and to receive relatively much larger fees, Laboratory and hospital facilities which the modern doctor ought to have are expensive and often inaccessible. Sanitation and preventive medicine are restricting and even eliminating diseases like typhoid and malaria which once afforded a good deal of practice. Free and pay clinics, school and industrial medical services. health insurance (under government auspices in Germany and England), hospital associations and all efforts to spread costs of sickness over large population groups, and other forms of social medicine tend to encroach upon what was once the exclusive field of the general practitioner. There are people who assert that this type of physician is doomed; that he will disappear because he cannot compete with the specialist on the one hand and with preventive and social medicine on the other.

"Such an outcome is to be viewed with concern. The well-trained, properly equipped, experienced general practitioner of ability, character and personality is a fundamentally valuable person. He is a good diagnostician. He sees his patient as a whole. He knows his peculiarities and circumstances. He can decide when to refer him to a specialist and when to protect him against the very real danger which is threatened by a narrowly specialist point of view. He cheers and encourages, warns and commands. He is not only a physician but a friend and counselor. The disappearance of the general practitioner would be a serious loss. The stimulating philosophy of individualism with its insistence upon independence, initiative, and ambition seems to be embodied in the general practitioner.

"He will survive only if he can win confidence and make a living. But he will have to meet the new conditions. He will have to submit to a measure of team-work in the use of laboratories and other resources; he will be compelled to recognize the public demand for sharing costs of sickness and, most important of all, he must become a practitioner of preventive medicine, a counselor of health, a man who can recognize and correct the minor but remediable physical and mental defects which are so common. This will mean an increasing preoccupation with the normal and a knowledge of the effects upon health of diet, exercise, mental attitudes, recreation and family and social life. to train men and women for this reinterpreted and redirected function, the medical schools will be compelled radically to modify their aims and methods and to 'permeate the curriculum with the preventive idea.'"—(*Information Service, Rockefeller Foundation.*)

Prevention of Ivy Poisoning

Upon returning from a walk in the fields or where poison ivy grows, carefully dust the clothing, particularly the lower parts and the sleeves. Clean the shoes with a brush before they are taken off or handled.

Keep the hands from the face until this is done and after it is finished wash the hands, forearms, face and neck with good soap-suds. Laundry soap is best. No particular scrubbing is necessary. Washington, even with plain water, helps.—(*Popular Health.*)

The Functional Activity of the Colon

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New York City

The student who sets out to study the physiologic action of the colon, or indeed, anyone who concerns himself even superficially with this subject is sure to be impressed with the remarkable sameness which pervades all the text-book descriptions of the colon's functional activity, and to note with surprise that there appears to have been little if any advance made in our knowledge of these matters since the period when the discovery of Roentgen made possible investigation of the digestive organs when they were functioning in the living individual.

The literature on roentgenologic investigation of the alimentary canal is now extremely voluminous, but a careful examination of what has been written still reveals that we are largely governed by the old pre-*x*-ray conceptions, when it comes to interpreting the demonstrations of roentgenology. Indeed, it would appear that we are relying overmuch on our ability to "see what is going on inside." and that in teaching medical students, there is a failure to stress sufficiently the groundwork of physiology, upon which all roentgenologic interpretation must be based.

The human body is the oldest "machine" of which we have any precise knowledge, yet even today this knowledge is far from complete, and the labors of those who are devoting their professional attention to a study of the colon, both in its normal and pathologic aspects, should be constantly bearing fruit in the shape of more exact expositions of its peculiar physiologic attributes.

In order to apply any therapeutic measures to the excretory tract, it is absolutely essential that the therapist be thoroughly versed in the anatomy and physiology of the part of the body he is proposing to treat. The exigencies of war at times compel a general to lead his troops into an unknown and unmapped region, but the wise soldier usually manages to equip himself with geographical and topographical details, so that he is fully acquainted not only with the "lay of the land" but also with the activities of the inhabitants both in war and peace. Only when thus equipped can he hope to crown his military operations with success.

The same is true of the colonic therapist; unless he is well versed in the anatomy and physiology of the excretory tract, alike in normal and pathologic conditions, he never can hope to succeed in combatting diseased conditions with which he is confronted, and misleading information—in his case, quite as much as in that of the leader of an invading military force—will be infinitely more harmful than no information at all. It thus becomes the imperative duty of all who are in possession of knowledge which can contribute to rendering any branch of the science of medicine more exact, to place this knowledge at the disposal of physiologists and therapists everywhere, and to endeavor further, to correct erroneous impressions and abolish obsolete conceptions wherever and whenever it lies in their power to do so.

In the October issue of this journal there appeared a very able article upon the anatomy of the pelvic bowel.[1] This article—as indicated by its title—is not concerned with function, yet it is evident that the author has made his observations upon the cadaver rather than upon the living subject, and his deductions show a deficiency in his comprehension of the functional activity which causes him to regard as permanent anatomical constructions, certain appearances which are actually due to functional activity—in other words are purely physiologic in origin, and not anatomic.

In the description of the sigmoid colon we are told that "commencing at the crest of the ilium, it forms a *loop* of variable length and position across the front of the false pelvis."

A few paragraphs further on we learn that "beginning at the iliac crest, the sigmoid generally arches upward and to the right across the abdomen to the right iliac fossa, where it forms one or two *coils*, and then passes down in the right pelvis into the pelvic cavity, toward the middle of the sacrum, where it joins the rectum, thus making an S-shaped *curve* within the pelvis."

The italics are mine; the terms "loop," "coil" and "curve" are uesd in such a way as to give the impression—whether or not the writer so intended—that their meaning is the same. Though the author admits that the position of the sigmoid "varies with the fulness or distention of the bowel itself" and that "active peristalsis may also alter its position," we are left with the impression that looping is an anatomic attribute of the pelvic colon, the single reference to peristalsis being the only concession to any possibly physiologic changes.

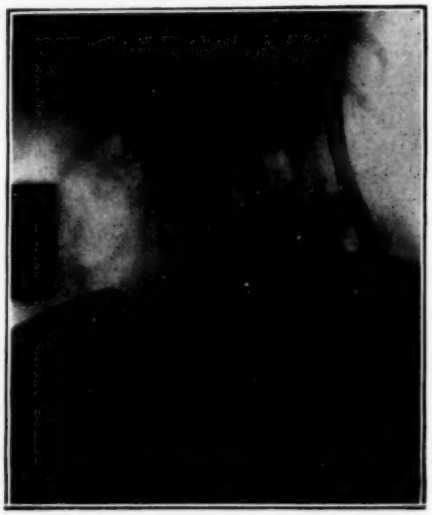
The passage of fecal residue through the excretory part of the intestinal tract is effected by the action of the longitudinal tænia muscles, which by their powers of contraction and expansion, lift the normal cecum from the right side, thus elevating the residual content of the bowel and forming a temporary valve. After this valve is formed, the cecum descends into the right pelvis. This elevating action straightens out what we came a few years ago to know as the "Lane kink." This so-called kink in the ileum is not, as has been generally supposed, pathologic, but is a purely normal physiologic phenomenon, occurring when the cecum is low in the pelvis.

When the residual content has been deposited near the hepatic flexure, the cecum relaxes and drops back into the pelvis, and the tænia coli musclces again came into play, contracting and moving the mass of residue part way, or half way, or even all the way across the transverse colon. Again a valve is formed behind the mass of residue, and the tænia muscles once more relax as far back as the hepatic flexure. This is the "peristaltic movement" which writers have been describing in practically identical terms for numberless editions of textbooks. Dissect these tænia muscles away from the colon, and there is left only a long sac. This is what the anatomist sees when he is investigating the colon of the cadaver, to whom the transient valve in the cecum which attends the active process of digestion is a thing forever past.

The action of the tænia muscles is governed by the pelvic nerve; situated on the left of the abdomen, they can thus be stimulated to act upon the sigmoid and descending colon, contracting it into loops. Such a loop has been illustrated upon page 128 of my *Colonic Therapy*.[2] The

loop there shown is at the splenic flexure. Another illustration on page 131 of the same volume is a reproduction of a roentgenologic view of a cecum tube passed into the colon.

In a very extended experience I have never encountered a colon which would not form such a loop, if the tube used were fairly flexible, except in very rare in-



Roentgenogram showing a loop of the sigmoid, which is carried low in the pelvis in its endeavor to expel the tube. The path of the sigmoid forms an anatomical S. Such a loop can be made in any portion of the colon from the splenic flexure to the rectum, by the action of the taenia coli muscles which stretch and shorten in a manner similar to rubber bands.

stances when the bowel was too atonic. A stiff colon tube in the bowel will render it powerless to coil or form loops. It is just this looping of the sigmoid which gives the contraction stimulus to the tænia muscles, enabling them to move the mass of residue along the colon. It can best be described as a traction from below. The transient nature of the loops thus formed is very evident from the radiologic views which are taken of the colon both when it has been entered by the cecum tube, and during the passage of a barium meal.

It should be borne in mind, however, that when such a tube has been passed as high up as the cecum, it exerts a strong stimulus upon the muscles, which raise the cecum in an endeavor to expel the tube.

When a barium meal is passing along the intestinal canal, however, the stimulus is of a different kind; the barium meal being a fluid, exerts an equalized pressure quite different from the resistent tube, and consequently the pelvic nerve is not stimulated to the same extent, and looping of the colon is very unusual, although it occasionally occurs.

When we turn to comparative anatomy we find that the physiologic angulations of the colon vary greatly with the species of animal, and the kind and amount of food with which its digestive apparatus has to contend. The tiger has no tænia coli muscles. He subsists upon a diet of extremely high protein content with comparatively little residue. The presence of food in the stomach of this animal generates sufficient waves to carry this small amount of residue through the intestinal tract to the rectum. Properly speaking then, the tiger has no colon at all.

But when we come to examine the intestinal tract of the horse, or to observe the process of equine digestion by means of the *x*-ray, we read a very different story. The horse has an intestinal tract averaging somewhere in the neighborhood of one hundred and ten feet in length, so that no waves generated in the stomach could ever serve to convey the food residues to the lower part of the bowel. Though the autonomous waves of the ileum will convey it as far as the terminal ileum, the propulsion of the residue along the greater part of the tract must be carried on by the tænia muscles, so that in this animal we get a very beautiful example of the way in which these muscles act. The colon of the horse is usually about twenty-three feet in length, and its diet is of such a nature that the amount of residue is very large. Therefore, a great deal of traction from below is necessary to move this large mass steadily along on its journey toward the anus, and much looping of the sigmoid will result, but these are transient loops and in the dissecting-room subject—be it equine or human—these are not likely to be seen.

In irrigation of the colon, or the application of any therapy to this section of the intestinal tract, a thorough understanding of these physiologic facts is of the utmost importance, for without them the therapist is like the Scriptural "blind leading the blind," and the ultimate fate of both physician and patient can be expected to be no better than that predicted for them.

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2. Schellberg, O. B. Colonic Therapy in the Treatment of Disease. Am. Inst. Med., New York, 1924.

The Physician a Helper of Nature

The best a doctor can do is to help nature to mend her own handiwork. She is the supreme healer.

In this way Dr. J. Allen Patton, medical director of the Prudential Insurance Company, explains the tendency on the part of progressive members of the medical profession to reduce the use of drugs to the minimum, stressing instead the laws of health and hygiene.

"The physician's highest skill lies in discerning wherein nature has been thwarted by man's abuse,—then in making straight the way for her to right the wrong," said Dr. Patton. "Sometimes this wrong can be righted by merely relieving the body of the strain which has been imposed upon it. More and more, physicians are trying this method first. If greater numbers of persons would have the patience and the confidence to give nature this chance, if they would spare her the injuries they daily, hourly, inflict upon her, we would have more so-called marvelous cures.

"Consider all the ills and ailments man is heir to as a result of wrong eating habits. Yet how many persons will give nature the opportunity to relieve them from this suffering by abstaining from the foods that their particular digestive system, for some reason or another, cannot dispose of properly. They would prefer eating unwisely and taking any and every sort of sedative to relieve the consequent suffering all the time permanently injuring the heart or other organs, than to exercise a little will power and eliminate the active cause of the trouble.

"Unless a physician can arrive at the cause of suffering he cannot try to remedy it. Once having ascertained the seat of the trouble he has to use his judgment in deciding the best method for removing the cause. Sometimes a drug must be used. Sometimes there is the necessity for surgery. But many times it is only necessary to stop the interference with a bodily function. Whether the cause of the disorder has been removed by surgery or by medicine it is nature that has to do the healing.

"All our work in public health is directed toward persuading people to give nature a square deal. Observation of the simple laws of health have a two-fold effect—preventive and curative. Drugs which ease one form of suffering, may at the same time work injury to a vital organ. It is nature that heals.

"Physicians appreciate the power of nature more than the laity and the decrease in the use of drugs, as curative agents, attests this fact."

Sydenham's Chorea

Chorea seems to be a manifestation of heredo-syphilis and is frequently relieved by the intravenous use of neoarsphenamine in increasing doses, beginning with 0.10 to 0.15 Gm.—(*Melo, in Riv. di Clin. Padiat.*)

The Physician's Month in the Law Courts

An Informal Review of Recent law cases affecting the Practice of Medicine

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Throughout the United States physicians and surgeons have happily not been very conspicuous in the law courts during the past few months, but what cases have been decided contain matters of practical importance to the profession as a whole.

As usual, the negligence case predominates. Not a month goes by without seeing litigation between the physician and his patient, with the latter charging the former with negligence in some method of treatment. One of the purposes of this review is to take off the technical wrappings of these negligence cases to present their practical point to the physician in plain, simple language, an effort which cannot fail to be of considerable usefulness to the practitioner who is anxious to inform himself as to just how and under what circumstances this negligence litigation arises. To know what has happened to other physicians in this regard will enable the rader to more amply protect himself from a similar experience.

Let us look at an x-ray machine case. It may be interpolated here that negligence cases arising from the alleged misuse of the x-ray form an increasingly large class of this kind of litigation. The common charge in all such lawsuits is that the patient has been carelessly burned by the operator. What do the courts consider carelessness in the use of the x-ray?

In the case before us the court says that a patient was to be subjected to a flouroscopic examination. The machine to be used was of standard make and equipped with all of the usual controls and gauges designed for the purpose and sufficient to apprise the operator of the amount of current being used enable him to regulate it. These gauges and controls were located—as is often the case—in a room distant, and separated by a hallway, from the dark room where the ray was applied to the patient. The machine had not been equipped with a stabilizer.

The physician in question employed a technician to operate the machine and at the time of the examination he instructed her to get the machine "ready for a flouroscopic examination according to the usual technique". The technician properly made the settings on the machine so as to deliver the ordinary current. But throughout the examination the doctor and his technician appear both to have remained in the dark room where the ray was being applied, no one being stationed at the gauges and controls to observe and regulate the current. In some way this currently apparently varied, with the result that the patient was burned, for which injury he sued the doctor. The question for the court to decide was whether the doctor was guilty of negligence in operating the x-ray machine without having a person stationed at all times during an examination at the gauges and controls.

The court found that the doctor was guilty of negligence in this respect. In so finding the court remarked that while it is not unusual to install gauges and controls in a room other than the dark room in which the ray is applied, because in the dark room it is difficult, if not impossible, to read the gauges while the current is being applied, and in a separate and lighted room such reading is simple and easy, still, the court further observed, that there was no testimony before it "even remotely tending to show" that when so installed it is usual or customary to leave the gauges during the operation, "or that such a course if recognized in the profession as being proper practice under any conditions."

In this last quotation from the court's opinion we have a statement of the general rule which the courts use in determining the negligence of a physician—is the course of conduct complained of one that is recognized as proper by the profession generally, or not always, but usually, if a course of treatment can be shown by the physician who is charged with negligence to be the course generally followed by practitioners, the courts will find in his favor and against the complaining patient. In this case the court found that it was not customary in the profession to leave the gauges or controls of an x-ray machine unwatched during the course of an examination.

The court adds: "The gauges and controls being parts of the machine and its equipment, manifestly made a part in order that they might be used; it being shown that, by their proper use, the results here complained of could not have happened; there being no denial of the positive testimony that the gauges should have been under the observation of some competent person during the application of the current, there was no conflict in the testimony upon the question of negligence . . . and the court would have been required to tell the jury that negligence had been established as a matter of law."

So then we get from this case a clear ruling by the court that it is negligence, subjecting the doctor to damages, who, in the course of an x-ray examination, leaves the gauges and controls of the machine unobserved, thus taking a chance on the current fluctuating and injuring the patient. If a stabilizer precludes the possibility of such fluctuating, it is probable that a prudent reliance on its efficacy would not be negligent. What the court means is that there must be definite and intelligent control of the gauges, or measurement of the current, whether by human or approved mechanical means, throughout an examination of a patient.

Patients sometimes attack their physicians in lawsuits from peculiar angles. Here is a case where a woman agreeing to submit to an operation for the transfusion of her blood, sipulated that the operation on her arm must be done with a needles and that the arm must not be "cut". She claimed that the doctors and nurses told her they would not "cut" her arm to reach the vein, and that the pain of the operation which she was experiencing was due to the injection of the needle. As a matter of fact, the doctors did cut her arm, says the court, although they assured her they were not doing so.

It was held that under these circumstances the woman might recover at least nominal damages, which means, of course, that the losing physician would have to pay the court costs of her action. It would seem to be clear that in this case all that the operators were attempting to do was to soothe a nervous patient by inducing her to think that the operation was being performed by one means rather than another—by a nedle rather than a knife—perhaps a not unjustifiable practice in certain cases. The patient had agreed to an operation for transfusion and there was no claim that the penetration of the vein by the knife was not a skillful and approved method of doing the work.

The trouble, however, for the medical men came in because the patient had expressly stipulated that it must be done with a needle. Had she not insisted upon this

means, it is very doubtful whether there would have been an action against the physicians for using one instrument instead of another, even though they misrepresented the kind of instrument they were using.

Beneath this case lies the principle of law that where one has explicit authority to do a certain thing, to do another tihng is an excess of such authority creating a liability in damages—generally nominal ones. If the doctor expressly agrees that he will perform a given operation in a given way, he may be liable in damages if he performs it in any other way, though the method actually used may be more skillful and beneficial to the patient than the method agreed upon. Medical men should be warned, however, that this principle can only apply to such cases as by their nature permit the patient to make an intelligent agreement with the physician on the method of doing the work. Undoubtedly, it would be negligent of a practitioner to permit a patient to dictate the course of an operation when the patient is obviously so uninformed in surgery as to be incapable of intelligent direction.

Here is another current x-ray case. A physician was being sued by a patient for damages for a burn on the hip which he had suffered during an x-ray examination by him. In the course of the trial the patient tried to prove that two years after he had been burned, this same operator had carelessly burned another person with an x-ray. The appellate court held that this second act of claimed negligence could not be shown to the jury to prove the first and ordered it stricken from the testimony.

Another case affords us an unusually clear definition by the court of the question of a physician's negligence. This is it:

"A physician is not a guarantor without express contract of the good effects of his treatment, and he only undertakes to do what can ordinarily be done under similar circumstances; that if the good effects of his treatment and the consequent value of his services be disputed, he must be prepared to show that his labor was performed with the ordinary skill, and in the ordinary manner of his profession, and this is all the essential evidence upon which to found his case."

A rather curious set of facts brings forth this declaration by the court. A surgeon had operated on a twelve-year-old child for a fractured femur. A few days after the operation, the patient one night involuntarily urinated and wet the bandage around the wound. Immediately thereafter he redressed the wound, taking off the soiled bandages, putting on clear sterilized ones and using antiseptics. For one reason or another the surgeon was afterwards sued for negligence in this operation as a whole and the jury awarded damages against him of over $5,000. Juries will do this sort of thing. The doctor appealed and the appellate court found that the precise question in the case was whether he was negligent in not protecting the bandages on the injury with a rubber cloth to prevent infection from urination.

The child had not involuntarily urinated for the two weeks or so in which she had been in the hospital and the appellate court was satisfied that it was not negligent for the surgeon to fail to anticipate that she would do so, and further that the gauze or open bandage was preferred to the exclusive rubber dressing by the profession generally. The case was sent back for a new trial, where, if it ever comes up again, the doctor will undoubtedly be victorious.

It is well that we have appellate courts.

Next to negligence, many cases come into the courts concerned with licensing of physicians and what may be called their governmental regulation.

It is the general and uniform holding of the courts that one who publicly confesses to cure or heal, or holds himself out as a physician, without a license to practice medicine as such, cannot recover compensation for his services rendered in such capacity.

A chiropractor who was working as such before that peculiar practice was licensed in his state, accepted a note in payment of his services to a patient, sued on the note and was denied recovery because at the time he rendered the service licenses were not issud to chiropractors.

So-called drugless healers of all sorts and conditions have cluttered the courts during the past years with litigation, chiefly rising from their struggle to obtain state authority to practice. Some interesting conditions are disclosed by these lawsuits.

Some years ago a drugless healer had obtained from the proper state authorities what was termed a limited license to practice his—what would call it? Art, craft, trade, science, sleight-of-hand? Anyway, to practice whatever it was. Some time later the legislature declared that a full license might be given to holders of limited licenses upon presentation of a diploma from an institute of drugless learning, shall we call it. This man had a diploma, sent it to the licensing authorities and received a full license, at the same time surrendering his limited license. Afterwards the authorities discovered that the school in question appeared to be so generous with its diplomas that it was giving them to persons not qualified to receive them, so they revoked this gentleman's full license and refused to return his limited one. He sued to get back his limited license and the court held that it should be given him.

Another state holds that treating ailments by chiropractice methods is "practicing medicine and surgery" within the meaning of the state law. This was directed at a chiropractor who had been fined for practising without a license and had appealed, claiming that such drugless healing was not within the "medicine and surgery" statutes requiring examinations and licenses. In justifying the law, the court makes this quotation:

"The power of the state to provide for the general welfare of its people authorizes it to prescribe all such regulations as, in its judgment, will secure or tend to secure them against the consequences of ignorance and incapacity as well as of deception and fraud. As one means to this end it has been the practice of the different states, from time immemorial, to exact in many pursuits a certain degree of skill and learning upon which the community may confidently rely, their possession being generally ascertained upon an examination of parties by competent persons or inferred from a certificate to them in the form of a diploma or license from an institution established for instruction on the subjects, scientific and otherwise, with which such pursuits have to deal. The nature and extent of the qualifications required must depend primarily upon the judgment of the state as to their necessity."

This is a very satisfactory statement of the philosophy of governmental control of the learned professions.

This control may take a wide form. We come to a case wherein a dentist's license was revoked for drunkenness in public places and operating an automobile while drunk. The act provided that a dentist's license could be revoked for various specified offenses, concluding with the words "or for any other dishonorable conduct". The court held that drunkenness came within the scope of "dishonorable conduct" and upheld the action of the board in revoking the license.

While this applies specifically to a dentist it is of interest to the medical profession generally because the spirit of it can readily be applied to all branches of medicine.

"What a man does when he has nothing to do shows what he is."

The Therapeutics of the Rheumatic Child

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Rheumatism is a common disease of childhood. It is caused by various strains of organisms, mostly diplococci. The disease is exceedingly rare in infancy and uncommon in early childhood. After the age of five years it is a frequent and serious disease.

As a result of the different degrees of susceptability of children to the rheumatic infection, the various portals of entry of the organisms, and the different strains and virulence of the bacteria, rheumatism may affect different tissues and organs and manifest itself in a variety of ways. It may be in the form of a carditis, pleuritis, arthritis, neuromyositis, chorea, tonsillitis, subcutaneous nodules, erythema and purpura.

Care should be taken not to diagnose all joint affections and all aches and pains in children as rheumatism. Scurvy, syphilitic epyphisitis, gonorrheal and tuberculous arthritis, osteomyelitis, Stills disease and flat feet should be excluded before a definite diagnosis is made of rheumatic arthritis. After this group of disorders are eliminated, a sore throat, a painful joint, an aching muscle, an unusual restlessness and an obscure fever should be considered as rheumatic and properly treated.

Treatment

The therapeutics of the rheumatic child consists essentially of three kinds of prevention. Prevention of rheumatic infection of those children who are predisposed to it, prevention of a recurrence in those who already had an attack of rheumatism, and prevention of the heart from becoming involved in the rheumatic meleé. For preventive as well as for curative purposes, treatment may be divided into general, hygienic and medicinal.

General Treatment.—A child with a rheumatic diathesis, or one that already harbors the rheumatic infection, should have his health built up and maintained in a normal condition. Flannel or woolen underclothing, protection of the feet from chilling and dampness and the avoidance of exposure to cold and inclement weather, are of the utmost importance. If circumstances permit, a rheumatic child should live in a dry, warm climate. Much can be done by improving the condition of the poor. There is undoubted evidence that many cases of rheumatism had their inception in a cold, damp house, scanty clothing and general poverty. In rheumatism, prevention is the safest cure.

Hygienic Treatment.—The nasal and the oral tracts should be put in a healthy condition. Carious teeth and ill looking tonsils must be removed. No tonsils need be condemned to slaughter simply because they happen to be there. An alkaline antiseptic mouth wash and gargle should be used routinely. The bowels should receive proper care. A daily warm bath is essential.

Medicinal Treatment.—Rheumatism is an ancient disease and the salicylates an old remedy. Time has sanctioned their use, though their exact pharmacologic action is still undetermined. Sodium salicylate with or without sodium bicarbonate in a palatable solution should be kept as a household remedy. On the slightest complaint which is diagnostic or suggestive of rheumatism, salicylate in the proper dosage should be given for a day or two. The child being kept in bed or indoors. In cold, damp and rainy weather, children who are predisposed to or had an attack of rheumatism should receive some salicylate as a prophylactic measure.

Treatment of Acute Rheumatism.—When there is fever with polyarthritis or any of the other symptoms and signs of acute rheumatism, the child should be put to bed in a warm, airy room till every symptom of the disease has subsided and the pulse shows no increased rate or disturbed rhythm. Proper nursing and tepid sponge baths are important.

There is no special diet suitable for rheumatic children. The prevailing practice of a meatless diet has no scientific basis. On general principles, the diet should be limited to milk, cereals, toast and butter. Plenty of water should be given either plain or as lemonade or orangeade. When convalescence begins, the diet should be more liberal with the addition of eggs and meat.

Quite a number of drugs are being used to combat the rheumatic infection. Sodium salicylate, aspirin, salicin, salophen and salol are commonly prescribed. Sodium bicarbonate, potassium citrate and the alkaline waters are also frequently used. Sodium salicylate with or without sodium bicarbonate is probably the best. Small frequent doses are better borne by a child than large doses which are depressant and harmful. If aspirin is prescribed, it should not be combined with sodium bicarbonate as it is commonly done. They are incompatible.

Codeine and phenacetin may be given to relieve pain. The usual practice of applying to the painful joints ointments containing oil of wintergreen, camphor, menthol or ichthyol is of doubtful value. They are uncleanly and give to the sick room a pungent, penetrating, disagreeable smell. The application to the joints of clean cotton wadding to keep them warm and at rest is all that is necessary.

When the acute symptoms are over, quinin salicylate with iron carbonate saccharated will do much good. It is good therapeutics to keep the child for months after an acute attack on some form of salicylate, given once at night, to keep the body salicylated. Serums and vaccines have, so far, not proven their worth.

Treatment of Chronic Rheumatism. (Chronic Arthritis.)—Much confusion exists in the diagnosis of chronic rheumatism. It is a common ill-defined misleading diagnosis. Acute rheumatism or acute rheumatic fever does not lead to chronicity and does not merge into any other disease. In a subacute form it may drag on for months in various ways and manifestations.

Unfortunately all aches and pains whether muscular, arthritic, synovial or neural are lumped together under a diagnosis of rheumatism. Chronic joint affections may by traumatic, infectious, toxic or metabolic and should be diagnosed as arthritis and not rheumatism. A chronic polyarthritis in children is occasionally seen which is known as Still's disease. It is characterized by a periarthritis, glandular and splenic enlargement. Osteoarthritis or arthritis deformans of obscure etiology may also occur in children.

The treatment of the various types of arthritis depends upon the underlying condition. Where the etiology is unknown, Fowler's solution with syrup of iodide of iron may be given. Diathermy,, massage and other forms of physiotherapy should be tried. Vaccines may be useful.

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Mentality and Anthropometrical Tests

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Educators and psychologists have in recent years given much attention to correlations between mental and physical characteristics. In this respect education is interested in anthropometrical tests.

Height-Mental Test

One of the physical characteristics that appears to have some positive correlation with mental ability is height. It is to that extent a test. Thus it has been found in studies of *large* numbers of school children[1] that taller children at each age have a higher per cent of brightness than dull children (50,000 cases). As confirmatory of this, it has been found that the feeble-minded are shorter than normal children[2], and that children with abnormalities are inferior in heigh to children in general.[3] It may be of interest to know that the height of man is somewhat definitely related to the weigh of his cerebrum (larger brain). The brain weight in ounces may be obtained approximately by dividing the height in inches by 1.6 for man and for woman by multiplying this quotient by 30/31.

Certain correlations of weight with mental conditions seem to be probable: heavier children of same age are usually brighter (50,000 cases); children of non-laboring classes are heavier than children of laboring classes[4] (20,000 cases). It is suggestive to note that the weight of the encephalon alatine to that of the body is approximately 1 to 35.2 in men and 1 to 36.46 in woman.

Cranial Mental Tests

Width of head is generally greater in precocious children than in dull children of the same age.[5] Broad-headed (brachycephalic) children are mentally superior to long-headed (dolicocephalic) children[6] (1,000 cases), as a class, which accords with the further facts, that colored children are more dolicocephalic than white children and also have less mental ability (1,165 cases).[5] This agrees with the statement of anthropologists that brachyaphaly increases with civilization. The larger the circumference of head in children, the greater the mental ability (21,930 cases)[6], which accords with the zoological fact, that in general, the larger the head in animals, the greater the intelligence. That the size of the head has something to do with mentality is based upon the fact that no brain in a head less than 12 inches in circumference has ever been known to function normally.

Cephalic Index Test of Race and Mentality

TABLE 31. *Mentality and Cephalic Index.*

Racial and Mental divisions of children	Dolico-cephalic	Meso-cephalic	Brachy-cephalic	Total No. of children
	Percentages			
Washington Schools:				
White children ...	11	48	41	1074
North Carolina mountains:				
White children ...	18	54	28	151
Washington Schools:				
Colored children ..	25	57	18	91
Washington Schools:				
Dull boys	15	41	44	137
Average boys	11	40	49	142
Bright boys	8	51	41	237
Unruly boys	40	39	30	10

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2. Goddard (Journal of Nervous and Mental Diseases, New York, 1919).
3. MacDonald (Report of Commissioner of Education, 1898-99).
4. Porter. Transactions of Academy of Science of St. Louis, 1894; also MacDonald, Report of Commissioner of Education, 1889.
5. Porter, id.
6. MacDonald, id.

Table 31 indicates that as races increase in superiority dolicocephaly decreases and brarycephaly increases. Thus 11 per cent of white children, 18 per cent of North Carolina mountain children, and 25 per cent of colored children are dolicocephalic, while 41 per cent of white children, 28 per cent of North Carolina mountain children and 18 per cent of colored children. These facts as to children are further confirmed by the general anthropological truth, that barbarous and savage races are mostly dolicocephalic, so that as dolicocephaly decreases, civilization increases. This general tendency is still further indicated in the second part of table, where the dull boys have 15 per cent dolicocephaly, and the bright boys only 8 per cent. The large per cent of dolicocephaly in unruly boys, who are unusually dull, should be noted.

Cephalic Index Test of Puberty and Age

TABLE 32.. *Puberty, Mentality and Cephalic Index.*

Pubertal and Mental Divisions of Washington school children	Dolico-cephalic	Meso-cephalic	Brachy-cephalic	Total No. of children
	Percentages			
Boys before puberty.	8	44	48	315
Boys after puberty..	16	48	36	201

Table 32 shows that 8 per cent of boys are dolicocephalic (long headed) before puberty and 16 per cent after puberty; that is, dolicocephaly increases greatly with age in children. On the other hand, brachycephally (broad around headedness) decreases 48 to 46 per cent as age increases in children. Now it has just been shown by tables that brightness decreases with age, and dullness increases. Brightness and brachycephaly and dullness and dolicocephaly therefore appears to be general concomitants.

Abnormality Test of School Children

TABLE 33. *Children with Abnormalities*

School children divided according to sex, nationality, and social condition (Washington)	Physical defects	Unruly and lazy	Total per cent	Number (Total)
	Percentages			
I. All boys	9	7	16	7953
All girls	7	1	8	8520
II. Boys, American parentage.	10	7	17	6024
Boys, foreign parentage...	4	5	9	1036
III. Boys, laboring classes....	6	6	12	2739
IV. Boys, non-laboring classes	14	9	23	3093
All bright boys.....	7	2	9	2899
All dull boys.....	10	13	23	1214
All average boys.....	13	10	23	3373

The per cent of abnormalities in children may be used to test them in this respect, in connection with sex, racial elements, social condition and mentality. Examining the first section of table 33, it will be seen that the boys (16 per cent) have twice as many abnormalities as the girls (8 per cent). This great difference is due mainly to the very high per cent of unruliness and laziness in the boys which are moral rather than physical abnormalities. From the second section of the table it is evident that boys of American parentage show about a double per cent (17) of abnormalities to boys of foreign parentage (9); this difference is mainly in physical abnormalities. The third section of the table shows the non-laboring classes (mercantile and professional) to have a very high per cent (23) of abnormalities (mostly physical) in comparison with the laboring classes (12). Section IV. of table shows the bright boys with only 9 per cent of

abnormalities, as compared with the dull boys and average boys (23 per cent).

Caution as to Applying General Conclusions to Man

These anthropometrical tests cannot be applied to single individuals, but only to large groups of persons. As a general rule, the probable truth of a conclusion about man increases with the number of cases observed, though in certain subjects, where there is great regularity and uniformity, the results based upon smaller numbers may be equally probable.

The public, however, must be cautioned against applying general conclusions to individual cases. Thus large groups of children of the same age with a larger average circumference of head show a higher per cent of brightness than other children. But it by no means follows that James with a larger head circumference than John is therefore brighter than John.[7]

7. See article by author in The Medical Fortnightly and Laboratory News, St. Louis, April 15, 1919.

Mental Test of Age in Children

TABLE 34. *Washington School Children*

Age	American parentage 6,024 boys and 6,463 girls	Boys Bright	Boys Dull	Boys Average	Girls Bright	Girls Dull	Girls Average
		%	%	%	%	%	%
6		43	7	50	58	4	38
7		64	8	28	63	9	28
8		56	9	35	58	8	34
9		65	15	20	62	4	34
10		42	19	39	56	11	33
11		53	16	31	47	7	46
12		51	10	39	39	10	51
13		51	12	37	35	7	58
14		38	21	41	35	14	51
15		52	24	24	37	14	49

Table 34 can serve as a mental test of age of children, after eliminating the element of race. It will be seen that as age increases there is, with some variations, a distinct increase in dullness and a general decrease in brightness, which is more marked in the case of the girls than that of the boys. That is to say, school children in general are brighter for their age the younger they are. It might be stated in this connection that the brains of children relative to their bodies increase slower as age increases. A child's brain at six years of age is very much larger relative to its body than at the age of fifteen.

Curriculum of Studies

TABLE 35.

American percentage	Mental Divisions	All studies	Algebra	Arithmetic	Drawing	Geography	History	Language, English	Manual labor, sewing	Music	Penmanship	Reading	Science, Botany	Spelling	Total No. of children
Boys	Bright	37	36	45	34	35	44	38	29	24	28	43	44	33	2267
	Dull	14	19	18	22	13	15	19	21	29	27	21	12	24	895
	Average ...	49	45	37	44	52	41	43	50	47	45	36	44	43	2862
Girls	Bright	40	49	36	35	36	41	46	40	40	40	54	45	48	2578
	Dull	9	11	18	17	12	15	10	9	10	13	11	15	14	607
	Average ...	51	40	46	48	52	44	44	51	50	47	35	40	38	3276

Curriculum Test of Sex and Mentality in Children

In table 35 are presented percentage ratings of grammar and high school studies, which can be regarded as tests of the efficiency of pupils in the branches mentioned.

Letting the averages represent the boys and girls as a class, it will be seen that in general or in all the studies (column 2 of table), the average for the girls is 51 per cent and for the boys 49 per cent; in other words, the girls are brighter than the boys. Taking the averages for the different studies, the girls excel the boys in arithmetic, drawing, history, language, manual labor, music, and penmanship, and are equal to them in geography; the boys excel the girls in algebra, reading, science, and spelling. Briefly, the girls excel the boys in seven studies and are inferior to them in four studies.

Pain Test of Educational and Sociological Status

TABLE 36. *Sensibility to Pain*

Educational, sex and sociological divisions	Number	Right Temple	Left Temple
		Grams Pressure	
University women	240	1796	1686
Washer women	14	3073	3092
Girls in public schools.....	244	2532	2563
Girls in private schools....	48	825	875
University men	58	2332	2127

Pathological Test of Physique in College Women

TABLE 37. *College Women (Age 17 to 21)*

Pathological Divisions	Weight lbs.	Lung Capacity Cubic Inches	Height C. M.	Strength Kilos	Total Number	Per cent of Total Number Per cent
	Averages				Number	
No disease	116	164	162	70	430	36
With disease ..	117	162	160	70	756	64
Typhoid fever .	117	168	160	69	754	4
Specific infectious diseases.	119	169	161	71	270	22
Constitutional diseases	119	161	158	68	85	7
Diseases of digestion	122	160	160	70	214	17
Hereditary diseases	116	163	160	68	178	14
Nervous diseases	116	161	162	70	89	7
Respiratory diseases	117	159	161	69	219	18
Insufficient respiration	115	164	161	69	334	27
Heart murmurs.	118	171	163	70	185	15
Scarlet fever ..	120	165	161	73	62	5
Habitual headaches	113	158	159	72	103	8

In Table* 37 will be found measurements of some eleven hundred college women together with pathological data, consisting of the diseases had during life.

From the first two lines in the table it will be seen that those having no diseases show a slightly better physical development than those who have had one or more diseases. In the matter of strength, however, the two classes are equal, suggesting that strength alone is not a criterion of health. Strength means strength of arms and hands.

Table 36 gives the results of measurements of the threshold of pain on the temples of university women and men and girls in schools, made with algometer.* The smaller the figures (in grams) for pressure, the greater the sensibility to pain.

Table 36 shows University women to be more sensitive to pain than university men, and washer women to be the least sensitive to pain of all, due, doubtless, to more hardihood of life. Girls in private schools are shown to be more than three times as sensitive to pain as girls in public schools, likewise probably due to more severity of life. In short, those with better education and social condition, appear to be more sensitive to pain. While education may increase susceptibility to physical pain, it

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*An instrument of precision designed and used by the author in obtaining the results in table. For further details see "Man and Abnormal Man" already cited.

* For details of study see Senate Document No. 400,57. Congress. 1st Session (by author).

Pellagra

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In view of the number of cases of pellagra, which physicians in the southern section of the country are seeing from time to time, I feel that it may not be amiss to discuss this condition briefly and to lay down such treatment as has been successful in my hands.

The history of pellagra is rather indefinite. It was first described by a Spanish physician, Gaspar Casal, in a book written in 1735 and published in 1788. Francois Thiery had heard of Casal's description and published an article about the disease seven years before Casal's book appeared, and both writers called the new disease Mal de la Rosa or Rose sickness. The condition was given the name of pellagra by an Italian physician, Frapolli, in 1771.

The disease undoubtedly goes back much earlier than the time of Casal, because the case of St. Francis of Assisi recorded in 1224, was very suggestive of pellagra. It is said there was a hospital for the disease established in Europe in 1578.

The etiology of pellaga is still indefinite. The Thompson-McFadden Pellagra Commission reports that "The disease is in all probability a specific infection communicable from person to person by means at present unknown."

D. Joseph Goldberger, U. S. Public Health Service, believes pellagra to be of dietary origin.

Dr. John L. Jelks, of Memphis, who has wide opportunity for close study, believes that pellagra is of infectious origin.

The causative factor entering and living where the human organism is deficient in certain elements. It has been attributed by some to a parasite transmitted by a simulium fly, or to food poisoning through photodynamic substances. Many class it with beri-beri, scurvy or rickets and some liken it to a deficiency disease (avitaminoses) caused by a lack of hypothetical activation of digestion and nutrition.

My observations extend over a period of six years, during which I have had the opportunity to observe these cases in the Shelby County Pellagra Hospital. I find that pellagra spreads from a center. That fulminating cases seem to obtain a double supply of causative factor. The solar rays without doubt have a very deleterious effect, as evidenced during the extremely dry and hot weather of the season of 1925.

Some reasons for the exacerbation of symptoms in hot weather are that the nervous system is more unstable, that skin eruptions caused by gastro-intestinal disurbances are more prevalent and that the protein diet is not as high as during cooler weather.

There are no definite pathological changes, which can be regarded as distinctive in this condition. Pellagra attacks persons of all ages, but by far the greater percentage is found in the fourth decade. The disease predominates in females and in Shelby County we have found that colored people are more prone to the condition than whites. We have also noted that more of the patients are from the rural rather than from the urban districts.

The first symptoms of pellagra are prodromal, the patient displaying a distinct picture of digestive disturbance, usually of an intestinal character. There is vertigo, vague pains, some diarrhea, occasionally alternating with constipation, insomnia, lowered blood pressure and a general feeling of malaise. This gives way to abdominal cramps, copious diarrhea and a sense of formication. The tongue is very often sleek and fiery red. Later on the characteristic skin lesions appear, showing symetrically on opposite sides. These may be seen usually on the back of both hands, the dorsum of the feet, and the elbows and knees. There may also be a collar around the neck. Some cases show the pellagra mask, first coming at the sides of the nose, then across the bridge and around the eyes. Sometimes a few spots will be seen along the spinal column, or there may only be a deepened areola around the anus.

In the white race these discolorations are at first red, turning later on to brown. In the dark races, they are dark, turning to black. In some cases the skin lesions grow progressively worse, until the epithelium is entirely denuded. We have seen the scrotum completely stripped of epithelium and the surface under a pendulous breast entirely raw. Oftentimes a stomatitis will be seen, the corners of the mouth sometimes becoming cracked and ulcerated.

The endocrine system is in a state of imbalance, blood pressure is very low and mental symptoms are likely to be profound. The nervous symptoms range from a slight irritability to even a pronounced and violent insanity.

In arriving at a diagnosis, the physician must exercise care in examination of the skin lesions, as these are likely to be the most important diagnostic land marks offered to him. Once seen and studied, they are easily recognizable, as no other dermatological conditions presents the same appearance or feeling. For example, the skin of a pellagrin feels somewhat like soapstone and has the appearance of a dishwasher's hand.

In the treatment with drugs, one treats the patient entirely rather than the disease, watching the alimentary tract and the kidneys for any ill effects following a forced diet.

Generally speaking, I have noticed some very good results following simple drug treatment. For instance, for the diarrhea we administer one dram doses of bismuth subnitrate four times daily, together with copper arsenite, gr. 1/100, four to six times daily. The nervous symptoms are usually controlled by the use of strontium bromid, 15 grains in a menstrum of peptenzyme elixir.

One of the most necessary mediums of treatment is a tonic. In some cases we have depended entirely on protonuclein, giving the patient two to four tablets following meals. Three of these cases have given remarkable results. One in a woman, 28 years of age, with decided mental complication, was not able to talk at the beginning of treatment, but after six months on this medication she was discharged as cured.

Another case in a woman whom we believed incurable on account of peculiar and unusually severe mental disturbance, has improved very noticeably under the protonuclein treatment. Being a mixed gland product, the action of protonuclein is somewhat slow, but it is apparently efficient.

Another tonic mixture we use is:

℞ Tr. Nucis Vom.
Peptenzyme Elix. qs. ft..... 3vi
M. et Sig. Teapsoonful after meals with 3 drops Fowlers Sol. added: increase one drop a day of Fowler's Sol. up to effect.

In the event the patient suffers from extreme prostra-

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Voice and Speech

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It may be frankly acknowledged that although we have many excellent specialists and operators in America, we have, as yet, no definite class of physicians for the proper care and treatment of the human voice.

Through the gradual growth of an appreciation of talented voices, the time is not far distant when we may hope for a truly individual class of physicians, specializing in voice only, just as we have orthopedic specialists, otologists, etc.

The proper care of the voice is a very interesting study and important branch of medicine, but instead of the laryngologist devoting more attention to its importance, it seems to have been allotted to the care of vocal instructors, the majority of whom are absolutely unacquainted with the fundamental principles of anatomy, physiology and hygiene of the voice.

In order that such a distinct class of specialists be formed—our post-graduate schools should pay more attention to this important branch of laryngology, in fact, should give as much attention to the proper use and care of the voice as they are giving to bronchoscopy.

In New York alone we have over four hundred thousand vocal and speech students and over 15,000 teachers, who profess to know something about the voice. This forms such a large percentage of the population, that it is shameful that their care should be in the hands of those the majority of whom are using destructive methods and are spoilers of good and most promising voices. This misfortune is due to the neglect and disinterestedness upon the part of our medical and post-graduate schools.

Not alone are the vocal instructors spoilers of good voices, but the majority of our so-called nose and throat specialists can be placed in the same category. A great many of our patients have nothing radically wrong with their vocal apparatus—except that the condition is produced by a wrong production of the voice.

I have come in contact with a great many laryngologists and when the subject of vocalism is brought up, the majority do not understand the fundamental principles of voice production and yet they undertake to treat singers.

They do not seem to know that the voice is produced by the vibrations of the vocal cords due to the expiratory blast of air emitted from the lungs, and the quality is reinforced by the resonating chambers, which are the cavities of the head. The majority believe that the quality is due to the vibrations of the vocal bands. If the specialist would realize that the quality is due to the reinforcement of the vibrations in the accessory cavities, there would be less operative interference, with the result that a good many promising voices will be spared from unjust ruination. It is true, I admit, a great many need operative interference, but the majority can and ought to be let alone.

For example, let us take plain hoarseness—a problem confronting the laryngologist, who deals with singers, speakers and those who depend for a livelihood solely upon the use of their voice. There are many causes producing this condition, but the paramount and chief cause is a faulty method of attack. The faulty attack usually causes the lining of the vocal apparatus to become congested and finally produces a degeneration of the mucous membrane, with hypertrophy of the glandular tissues and also produces enlarged lingual veins. In most instances upon examination you will find permanent changes in the deeper tissues of the pharynx, also an alteration in the secretion, thereby resulting in a difficulty in using the pharyngeal muscles—this causes the constant and persistent symptoms of hoarseness and an irritating cough.

Improper breathing and lack of knowledge of the proper method of attack causes the singer or speaker to use his muscles of phonation and the muscles of articulation incorrectly, thus causing an overtaxation of the laryngeal and pharygeal structure. Due to this increased action of the muscles, there is a great increase in the blood supply and if persisted in marked changed in the deeper tissues occur, which finally leads to a relaxation of the walls.

Most of the throat specialists believe that the enlarged linguals and tissue changes are the cause and not the result—go right ahead and operate, instead of using expectant treatment. Result impairment of a probable good voice.

If the physician were properly trained, he would first examine his patient's voice with a few scales or have him sing or recite a simple piece or poem, so that the physician would become acquainted with his patient's method of intonation and attack, in order that he be put on the right road for the correct carrying out of his treatment. This should be done before examining the patient's nose and throat for any pathological conditions; by adopting this method a good many tonsils, turbinates, etc., will be spared.

I have an opera singer who comes for treatment from time to time, sixty years of age, possessing a very good robust tenor voice—this gentleman has had an enlarged left angiomatous tonsil since birth, which does not interfere with his tone production. His hoarseness is usually due to climatic changes and not to this pathological growth.

In order that the nose and throat specialist be properly trained in the proper production of the voice, the post medical schools teaching laryngology should also devote some time to instruct their students in this important subject.

The human voice is one of nature's noblest gifts and when properly understood and produced is far superior to any musical instrument.

Again I repeat that this subject which has been grossly neglected is even more important than bronchoscopy, which is an emergency operation, and not so frequently encountered in our daily practise, as defects in voice and speech.

The post-graduate schools should adopt this branch of laryngology and teach it systematically.

The following program I would suggest for adoption:

A. The anatomy and physiology of the vocal apparatus, including the diaphragm and the cavities of the head.

B. The mechanism and physiology of correct respiration in voice production.

C. Nervous mechanism.

D. Physics sound.

E. Psychology of voice and speech.

F. Voice and speech.

G. The principles of resonance and quality.
H. Phonetics.
I. Classification of the voice.
J. Hygiene and care of the voice.
K. Audition—in voice production.
L. Affections of voice in singers and speakers.
M. Treatment in general.

I trust there will be a time when the medical profession will be awakened to the fact that intelligent practitioners alone should treat singers and speakers.

I hope the time will come when they will realize that the requisites are an intimate acquaintance with the fundamental principles of vocalism and a good knowledge of medicine together with an accurate knowledge of the anatomy, physiology and hygiene of the human vocal apparatus. Indeed, every physician graduating in this enlightened age should know the general principles of vocalism and correct speech, so that he may be able to instruct his patient intelligently, when and how he should take care of his voice. Every patient has a moral right to expect that his particular doctor shall be able to tell him what to do. The great trouble is that the average physician and specialist knows absolutely nothing about the production and mechanism of vocalism and so cannot advise his patients intelligently.

Steinway Hall, N. Y.

Malaria, The Universal Enemy

The Commission on Malaria of the International Near East Association, consisting of Fridjof Nansen, M.D., Norway; William A. Kennedy, M.D., England; William S. Dodd, M.D., United States; Apostolides Doxiades, M.D., Greece, and William Jourdan Rapp, Secretary, have presented a preliminary survey on their findings.

In Greece, Asia Minor, Syria, Palestine and the Caucasus, malaria is a veritable scourge. The wars and revolutions which have swept over these countries in recent years have broken down the resistance which the population had developed to the disease, and death stalks today on the wings of mosquitos throughout the lands which were the cradle of Western Civilization.

In every war in the Near East from the remotest historical times until today, deaths from malaria have far exceeded those from steel and cannon. Whole armies have been defeated and wiped out by the deadly plasmodium.

Malaria was an important ally of the Turkish Nationalists in defeating the Greek Army in Asia Minor. The Turks were fighting on their native soil and were more resistant to the ravages of the malignant malaria epidemic in Asia Minor than were the invading Greeks.

The Germano-Bulgarian and Allied armies fighting in Macedonia during the Great War lost twenty men from malaria to one killed in action.

Malaria, throughout the Near East, is a social and economic disease. Like tuberculosis, it can be influenced and even eliminated, by proved measures of social hygiene, notably by improved conditions of housing and feeding. Insufficient nourishment and bad living conditions undermine the resistance of the populations, and this resistance can only be restored by remedying the cause.

Quinin is still the only serious weapon of the doctor against malaria. The manner in which this drug acts has recnetly been the subject of careful study. In the Near East Relief orphanages, careful charts have been kept on thousands of patients undergoing various types of quinin treatment. In a large group of cases, comparatively small doses of quinin have prevented relapses of the disease in children whose infection was not deepseated. But the experience of refugee-camp doctors is much less favorable, and the question naturally arises as to the manner in which quinin exercises its curative effect.

Formerly it was thought that quinin was a specific poison to the malarial parasite, and cured the disease by killing the parasite. Were this a complete explanation, it would follow that big doses would be more effective than small ones. But this is not the case. There is now almost overwhelming evidence that quinin, after absorption by the human organism, is somehow modified by the body cells and thereby changed into a substance which is fatal to the malaria parasites.

Thus man himself is to some extent responsible for his cure, and any factor which reduces his power of self-help must reduce his hope of cure. What these factors are we can only speculate, but they probably include deficient nutrition, ill-health due to extraneous causes, exhaustion and strain, repeated infection, and perhaps also overdosing with quinin.

The student of malaria must acknowledge that in reality he is not yet in a position to suggest any single plan for dealing effectively and permanently with the disease as it exists in the Near East. "Keeping eternally at it" must necessarily be his first and soundest maxim.

The discovery of the mosquito cycle of the disease, though of fundamental value, revealed only the most important link in the epidemiological chain. Many auxiliary factors, of which at present we know only a few, play an important part in the epidemiology of the disease.

Although we have seen many instances of measures taken against the larval or adult mosquito, there was not one of them in which the efficiency of the measure had been proved by its influence on the prevalence of malaria. This does not mean that there was not often such an influence, but that statistical proof has not been obtained.

Among general measures against malaria, first consideration should be given to improving the health of the human subjects of the disease, and to undertaking certain sanitary operations against the anopheles mosquito. These measures have passed the stage of criticism and experiment, and may be recommended for general adoption, both from the practical and economic points of view, and as being calculated to yield appreciable results.

All infected persons should be treated systematically with quinin and its derivatives. The treatment must be prompt, energetic, regulated according to the condition of the patient, and prolonged even after the clinical cure is effected.

Sanitary operations against the mosquito give results if applied in limited regions, if well chosen and studied, and above all if directed particularly against the breeding grounds of the mosquito.

Too great emphasis cannot be laid on the importance of an increase in the production of quinin, the world supply of which is at present inadequate.

Greece

Without doubt Greece has been ravaged by malaria since antiquity. We have documents dating back to 500 BC from which it can be learned that certain parts of Ancient Greece were infested with an epidemic disease which judging by the description should be considered as malaria. Hippocrates, 400 BC, clearly described the different fevers which correspond to the tertian, quartan, and certain comatose malignant forms of malaria. Also, we possess descriptions written by various doctors of Byzantine times which leave no doubt as to the existance of malaria in Greece in those days.

During the four centuries of Turkish domination in Greece, the deforestation of the country and the neglect of cultivation of the valleys greatly increased the area of swamp land and also the prevalence of malaria. After Greece won her independence in 1830, malaria became still more prevalent, as a great part of the population moved from the mountains where they had taken refuge down into the valleys.

Both the climate and topography of Greece are favorable to the development of the anopheles mosquito. There are few trees except in the hearts of the mountains and heavy rains in March and April form torrents which flood the plains making extensive marshes. Here with the surrounding temperature gradually rising until it reaches 105 degrees Fahrenheit in August, is a perfect breeding place for the anopheles.

No systematic effort to combat malaria in Greece was undertaken until 1905. At this time an association to fight the disease was formed in Athens with branches in all the provinces. Due to the work of this association there was voted in 1907-8 a law giving the State the monopoly of the purchase and sale of quinin. By this law it was possible to distribute a chemically pure quinin at a moderate price. The association also carried on a campaign of education aiming towards a general treatment of all carriers of the germ as indicated by blood examinations and towards the cleaning up of all stagnant waters.

The work of the association had very salutory effects and contributed towards reducing the mortality from malaria as well as towards eliminating the more grave and malignant forms of the disease. However, due largely to the great in-

flux of refugees into the country—since 1912 one million and a half entered the country from Asia Minor, the Pontus, the Caucasus, Eastern Thrace, and Bulgaria, the situation is today worse than it probably ever has been in the past.

Today one-third of all the inhabitants of Greece have malaria. In Macedonia and Thrace the percentage of infected persons is more than one-half of the whole population. During the last two years malaria in these provinces has not been epidemic but epidemic and malignant.

The population of Macedonia and Thrace can be divided into four different categories: (1) indigenous inhabitants, (2) refugees who arrived during 1912-15, (3) refugees who arrived in 1922, and (4) refugees who arrived in 1923-24. Numerous spleen examinations have been made by Near East Relief of large numbers of people belonging in these various groups, and provides some interesting information. Parenthetically, it should be said that spleen examination is not an efficacious method of detecting the spread of malaria, as not all persons attacked by the disease show enlargement of the spleen. In fact, this enlargement is mainly found in patients who have had more than one attack or in those suffering from one of the virulent forms of the disease.

Among the children of the indigenous inhabitants and of the refugees established in Macedonia and Thrace for more than ten years, the spleen index is only two per cent.

The children of the refugees who arrived in 1922 show a spleen index of fifty per cent.

The children of the last refugees to arrive are those who suffer the most intense fever with acute spleenitis.

This last group is largely made up of refugees from non-malarial districts who have been infected for the first time on their arrival in Macedonia and Thrace. Because of this the disease has taken among them an epidemic character and is far more malignant than among the autochthenous population, who have little by lttle developed resistance to the disease.

Contributory factors to the virulence of the infection among recent refugees have been the defective housing and malhygienic conditions under which they have been living, as well as under-nutrition.

It is interesting to note that refugees from malarial districts in Asia Minor, the Pontus, the Caucasus, and Eastern Thrace who have chronic spleenitis offer an even greater resistance to the disease than the indigenous inhabitants.

From these statistical reports it can be seen that the malarial problem in Greece is extremely complicated from an epidemiological viewpoint, as the disease has conserved in certain parts of old Greece and in certain parts of new Greece its original endemic character while in other parts it has assumed an epidemic nature as a result of the infection of refugees from non-malarial districts and the importation of a malignant type of disease by refugees from malarial districts abroad.

In the summer and fall of 1923, the conditions of the peasants and refugees in the villages of Macedonia were deplorable. We visited numerous villages where every adult and a large percentage of the children were in bed with fever. We have seen crops rot in the fields for lack of hands to harvest them. In the village of Turkohori, inhabitated by refugees from the Caucasus who arrived in 1921, there had been 350 deaths out of an original population of 800. Hardy mountaineers, these refugees came and settled in the valley of the Vardar and soon succumbed to the endemic malaria which in them became epidemic and malignant, bringing death to almost one-half of them.

To meet this dangerous situation, the Greeek government in 1924, with the advice and cooperation of Near East Relief, organized one hundred malaria fighting units. Each unit consisted of a director, a nurse, two disinfectors, and a number of laborers. The equipment of each unit was made up of 4,000 quinin tablets of 5 grains each, 500 ampules of quinin for injection, some simple pharmaceutical equipment, petroleum containers, and the necessary tools for digging small ditches and filling up small pools of stagnant waters. These units were sent out over the country to the various malarial districts especially where large numbers of refugees were concentrated, as in Salonika, Serres, Drama, Maritza, and Rhodope in Macedonia and Thrace.

The directors of the malaria units, as well as a part of the auxiliary personnel, received one month's instruction in schools established in Athens and Salonika. Two hundred advanced medical students followed the courses. They were taught how to identify malarial victims by microscopic blood examinations and to distinguish between the three types of plasmodium. They also studied the life cycle of the anopheles mosquito and the malarial plasmodium which uses it as a host. They became proficient in finding the larvae of the anopheles in stagnant waters and identifying the characteristics which distinguish the adult anopheles from other harmless mosquitos, and finally they were trained to employ quinin and other auxillary medicaments in the treatment of malaria.

This instruction was supplemented by some field work under the direction of experts, which gave the students experience in finding and eliminating as far as possible local conditions favoring the spread of malaria. The part that housing, nutrition, and working conditions play in the prevalence and potency of the disease was emphasized. The methods of fighting the anopheles in homes both as adults and larvae were considered, as were the methods of executing small draining jobs. Experiments in educating the general public as to the facts regarding malaria were also undertaken.

The work of these units has been fairly successful. As a result of their work, especially in treating malarial victims, the mortality from the disease has been reduced and the enforced idleness of agricultural workers due to fever has been much less than previously. The units have been able to visit remote villages and thus bring relief to sufferers who otherwise would never have been treated. Distribution of quinine through these units has been more successful than when made through local committees, as these committees did not always give the quinine to those needing it most, but frequently made the distribution with personal or political ends in view.

The most successful Greek experiment in complete control of malaria was that conducted by the Near East Relief in Corinth. In 1923 the Near East Relief established a large orphanage in Corinth. When the malarial season came on, practically every child developed the disease. To cure the children permanently was impossible unless the anopheles mosquitos, which constantly reinfected them from carriers among the local population, were eliminated.

By making use of the older orphans, it was possible to clean the refuse and weeds out of 750 miles of irrigation ditches and to spray with petroleum all stagnant waters too large to drain. These older orphans also acted as an inspection force and with the cooperation of the local authorities saw to it that open wells were covered and water barrels and cans either emptied or covered. The entire city gave the work their enthusiastic support and in 1924 malaria in the orphanage was completely under control and greatly reduced in the city. There was some grumbling on the part of local doctors—and even undertakers!—to the effect that the Americans by their sanitary work were depriving them of a living!

It is estimated that the amount of quinine needed each year in Greece to deal adequately with malaria is forty tons. In 1924 the American Red Cross contributed ten tons to this total.

The principal force in the fight against malaria in Greece should be the government through the Ministry of Hygiene. As large an appropriation as possible should be made to this end. Various foreign, international, and local organizations and societies can help tremendously through their contributory efforts in the future as they have in the past.

Asia Minor

No place in the world presents so tragic a picture of the ravages of malaria as does Turkey today. Dr. Earnest Basso of Smyrna in a report to the Near East Relief writes: "Malaria at the present moment dominates the social and economic life of the country. The time is not far off when both authorities and individuals, no matter what the cost, must open their eyes and organize a defense against the disease. If the fight against malaria in Asia Minor is not begun soon we shall see the vigor and health of a whole people, previously admired for their splendid physical constitution, undermined completely and the nation threatened with extinction."

Fighting malaria in Asia Minor is an uphill task. Everything has yet to be done. When one comes into contact with the actual conditions he is shocked not only by the gravity of the problem but also by the baseless optimism of officials and their refusal to face reality.

As there are no statistics, it is impossible to present the actual situation with any scientific exactitude. The sanitary organization of the government is conspicuous by its absence. It gives no sign of activity except in the work of a few officials more intelligent or more industrious than the average. But this activity, as one can well imagine, soon ceases before the general indifference and before the futility of uncordinated individual effort. The anti-malarial struggle is occasionally the object of discussion in a few cultured circles but it never really has become any more than a purely theoretical question.

There are practically no credits available for the fight against malaria. There is no organization and no tangible scheme of attack. The occasional distribution of a few hundred pounds of quinine without any definite plan regarding regions or seasons cannot be considered of any importance.

Asia Minor is faced today with one great reality,—malaria. It dominates everything and menaces everybody.

(*Continued on page 287*)

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"Genius and Disaster"

Professor Jeannette Marks, of Mount Holyoke College, raises the question as to whether drug mentality is to set the standard for English poetry and prose, or whether normality is to be our canon, at least for childhood and adolescence. She suggests, in her remarkable study ("Genius and Disaster," Adelphi Company, 1925) of the narcotized or diseased creative artist, that we should either revise our list of so-called "classics" by the help of the literary alienist or pathologist, or else accept the abnormal, the diseased and the morbid as pacemaker in what we call our best literary achievements.

She indicates her own commitment to the "law" that sanity, balance of thought and form in expression must ever be part of the Anglo-Saxon ideal for poetry and prose. "Foreign to the English habit of mind is that racial Celtic ecstasy which swings the word away from the reality and tosses it lilylike in white passion towards heaven. And ever foreign, too, must be the enslavement of our poetry and prose by the Dark Angel of Opium."

The author's plenary equipment and *n*th-degree type of feminine insight enable her to analyze the elements in the make-up of geniuses of the Poe, Thomson, Swinburne, De Quincey, Rossetti and Thompson order and to trace and differentiate the effects of alcohol, opium and tuberculosis upon their creative mechanisms and upon their productions.

This is one of the most significant books of the day for the thoughtful physician, the educator, and all having literary tastes and interests and some concern as to human progress. Here is one literary critic who has not forgotten the human body "from whose interrelations springs not only the greatest cathedral but every book in every library of all the world and every human institution ever erected," and who takes into account the toxemias which so very frequently figure in creative work of every kind. This is scientific criticism. It may very well be, as Professor Marks suggests, that every problem in literary genius goes back not to the man alone but to the microbe and the man, as well as, in many cases, to drugs of one sort or another.

We can see Professor Marks in no other light than as a kind of Columbus in literature, for she has charted with the utmost daring and accuracy a great part of a hitherto mystical sea, using every modern aid and bringing to bear upon her most difficult but fascinating problem an uncanny understanding, which in itself is a kind of genius, of the "lost children" yclept geniuses of her book. She is an ethereal mother to her literary children, discerning their very souls.

What is the secret of her penetrating study? Why is she able to do what no man, to our knowledge, has ever done or been able to do? It is because she sees how the feminine and the childlike in the enius play their parts. This has been well explained by another woman (of course!), Dr. Beatrice M. Hinkle, who writes: "That the artist is a bisexual being has been obvious enough, most artists being entirely aware of the woman in themselves . . . The artist *bears the woman within himself* with whom he enters into a psychic coitus and from whom, through him, proceeds the child, his art. . . . In every case . . . the production of an art work is preceded by what can be called a *psychic coitus between the puer æternus and the soul* within himself, and when, through some psychic interference or weakness, this does not take place, no art child will be produced. It is this play with himself, which is at one and the same time a sort of symbolic incest relation and an autoerotic process, that sets the artist apart from the rest of humanity and serves to produce his intense self-love and general disregard of others. His chief interest and love are given to that other being, the subjective feminine component within himself, his soul figure, through whose aid his psychic children are produced. To be sure he often projects her image upon some person in the outer world, for he possesses objective needs as well, but primarily this is for the sake of her stimulation or value to him as a creator. However, another person brings in the problem of reality, and reality has claims of its own and cannot be completely submissive to the will of another. Therefore, when the artist marries he generally cannot maintain for long the reality relation he has assumed, for what he actually wants and needs in marriage is a mother who will sacrifice all willingly for him, give much and demand little in return. He desires to be the spoilt and favorite child, for his own interest is occupied primarily, and often exclusively, with his creative activity and its product, and objective reality only exists for him as something that can contribute to his main purpose in life. . . . It is the possession of these subjective entities, definitely organized but quite unadapted to outer reality, that causes the artist to be recognized as possessing 'the soul of the child.'"

Who but a woman could be expected to comprehend the child and woman in the genius?

"Genius and Disaster" is a small book containing pioneer stuff of the highest order—stuff that will yet engage the energies of our Foundations and research institutes and the attention of sources of endowment seeking

worthy builders—and a wealth of practical implications for the discerning. In style and content it is a masterpiece which will take an assured place among the classics of criticism.

The nature, genesis, ethnical "chemistry," mechanisms and evolution of genius are bound to be subjected to intensive scrutiny at the hands of a new school of laboratorians. The era of mere wonderment is about to pass. As the slowed movements of normal and abnormal organisms are analyzed on the cinematographic screen, so will be objectively and deliberately studied that which, in the genius, is now intangible, equivocal, evasive, fleeting, or hopelessly abstruse. This Mystery of Mysteries cannot longer evade such clairvoyance as that of the Mount Holyoke school of criticism. Let us have done with our exhaustive studies of Caliban, and turn cognitive eyes toward Prospero and his magic wand.

Anthropoids and High Heels

The very high heels worn by many women produce a mode of locomotion closely resembling that of the anthropoid apes. Some apes can maintain a plantigrade posture for a while, but on starting to move forward speedily assume the all-fours position, with heels far off the ground and never touching it. They run along on the phalanges and metatarsals, and it would seem that the ankle, for them (and for many of our women), is just as much between the proximal and distal tarsal bones as it is between the tibia, fibula and astragalus.

Weak foot, flat foot and the feminine tendency to wear high heels are all possessed of special significance in their relation to the locomotive equipment of the anthropoids.

When the anthropoid does stand erect his feet are weak and flat, and when at first he gets into action he walks or runs, literally, like a woman with very high heels, afterward dropping to all fours.

If the anthropoids took to wearing shoes they would undoubtedly have to be of the extremely high-heeled type.

Birth Control and Prohibition

It is probable that Federal and State prohibition of the dissemination of birth-control information has been a very great factor in spreading the practice of regulating the size of families, just as prohibition of a similar type has greatly increased drinking habits among certain classes of the population, notably the young.

In other words, bootlegging in the sphere of reproduction is practised by the people on a larger scale than it would be were there no such laws on the statute books. What would have been moderately practised is now immoderately resorted to, with the result that the birth rate is tumbling among many groups. And it seems to be true that the same class of people who formerly used little or no alcohol as a beverage, but who now are pretty good drinkers, are the same people who are practising birth control most intensively. We have in mind the better type citizens who for psychological and traditional reasons are unamenable to oppressive laws and are inevitably bound to circumvent them and ultimately to defeat them.

Vice President Marshall, at a critical time in the country's history, was asked what he thought was most needed to restore normalcy, and shocked many solemn folk by declaring that what the nation needed most was a good five-cent cigar.

Our suggestion for the present day is a Federal Amendment prohibiting large families.

Miscellany

CONDUCTED BY ARTHUR C. JACOBSON, M. D.

The Principles and Practice of Hugh Owen Thomas, Inventor of the Thomas Splint*

Hugh Owen Thomas was born when his mother was on a visit to her parents at Bodedern, Anglesey, 23rd August, 1834. Her husband, Evan Thomas, was also a native of Anglesey, where his forefathers for many generations had practised as bone-setters. At the time of Hugh's birth his father had established his home in Liverpool, where his name as a bone-setter had already spread beyond the confines of the city. Hugh was a delicate child, and, on account of his health, was brought up in the country, attending school first in Anglesey, then in St. Asaph, and afterwards, when he lived at home, Dr. Poggi's school, in New Brighton. His professional career may be divided into the three following stages:

(1) *Apprenticeship and Studentship*—from 1851, when he went at the age of 17 as apprentice to his uncle, Dr. Owen Roberts, of St. Asaph, until 1858, when he "returned from a short period of study" in Paris to commence the practice of Medicine in Liverpool at the age of 24. Of these seven years, four were spent with his uncle, two at the University of Edinburgh, and one at University College, London, and in Paris.

(2) A period of *Practice and Observation* extending from 1858 when he joined his father in Liverpool, until 1875, when, at the instigation of Professor Rushton Parker, he commenced to publish his observations. The partnership with his father—a skilful, but moody man—at 72 Great Crosshall Street—lasted scarcely a year; in 1859 H. O. Thomas made his home at 32 Hardy Street; in 1870 moving to a house close by No. 11 Nelson Street, his home until his death. In an adjacent house he established his hospital and set up his workshops. Thus his life was spent in the most central and busiest quarter of Liverpool. In 1864, at the age of 30, he made a happy marriage, but had no children.

(3) A period of *Practice and Publication*, extending from 1875, when he was 41, until 6th January, 1891, when he died early in his fifty-seventh year. In publication, as in every affair of his busy life, he set convention aside and followed his own judgment or fancy. He employed his own printer and, at first, acted as his own publisher. The high-wheeled phaeton, in which he drove a pair of black horses, was of his own design; so was the nautical peaked cap he wore to shade his eyes; so were the medical theories he evolved and the surgical appliances he invented. He was a thin, dark, fragile-looking man, well under medium height—5 feet 3 inches or 5 feet 4 inches—but of indomitable spirit and of unbounded power of application. His profession was his hobby, and in his hobby he included the art of healing in its widest scope. (From "Menders of the Maimed," by Arthur Keith, M.D., 1919, pp. 35-36.)

Hugh Owen Thomas, M.D., M.R.C.S.

Lancet, Jan. 17, 1891, p. 174.)

A grief so profound and widespread as that which was manifested at Liverpool on the 10th inst., when the remains of Dr. Hugh Owen Thomas were laid at rest, is seldom witnessed. There can be no more eloquent or

* These data were kindly supplied to the MEDICAL TIMES, in response to a request for summaries in the British literature of Thomas's career, by Mr. H. E. Powell, Librarian of the Royal Society of Medicine, London, England.

touching testimony to the worth of a man's character than the tears of the poor among whom he had lived. The toilers at our docks and warehouses are not sensitive beings, and the daily struggle of their lives is too earnest to admit of much display of sentiment. To see thousands of these, then, men as well as women, as anyone might have done in Liverpool on Saturday last, stirred to their very depths by an emotion that found expression in passionate sobs and tears, as they lined the streets or pressed forward to gaze into the open grave, proved that its silent occupant had won his way to their hearts. Dr. Thomas was in every respect a remarkable man. The frail health, often disturbed by acute bodily suffering, with which he entered upon practice some thirty-three years ago, gave but little promise of fruitful labor. But his naturally great ability, and the force of a quietly dauntless character, enabled him to overcome every obstacle and to win his way to the very front rank in the department of surgery to which he more especially devoted himself. He metamorphosed the treatment of diseases of the joints, and thousands of sufferers throughout the world are benefiting to-day from the universal adoption by surgeons of "Thomas's splints." But his mind was so active and many-sided that there was no department of his profession on which it did not advantageously exercise itself, and those who were privileged with his friendship—and he was the most approachable and friendly of men—were often astonished at the profundity and originality of his ideas on some of those problems of medicine which his large general practice brought before him. Thus he did more than any other modern medical men to restore, if he did not even originate, a rational treatment of intestinal obstruction; and, curiously, about three months before his death from pleuro-pneumonia on the 6th inst., he was brought into great peril by this very affection, and owed his recovery to the successful application of his own well thought out principles. Epilepsy was also a disease which engaged much of his thoughts, and the success with which he treated many obstinate cases was often a matter of surprise to those who watched him. Probably the true secret of the success of his wonderfully useful and active life lay in the intense interest which he took in every subject which presented itself to him, and in the pleasure which he experienced in viewing it in all sorts of unconventional lights. Thus his profession, instead of wearying, never ceased to delight him, and the greatest distress which he could have experienced would have been forced retirement from it, even for the purpose of a short holiday. Yet his range of interest and reading extended far beyond surgery or medicine. In politics, in history, and in antiquities (especially those of Egypt) he was an enthusiast; while his love of practical mechanics was shown by hours of healthy work passed in his elaborately fitted lathe and machine room, where he constructed many of the ingenious contrivances which he had devised for use in his practice. And his devotion to practice displayed the peculiar loveliness of his most unselfish character, for it was not with a mere sordid desire to accumulate wealth that he labored as he did. The great majority of the subjects of his unwearying industry were poor people. The rich, of whom many from all parts of the world sought his professional aid, never found their riches a superior passport to his attention. He loved the poor, and without stint, or hope, or expectation of any other reward than the consciousness of having aided them, apparently without the least idea that he was doing anything unusual, devoted all the resources of his most ingenious and inventive mind to their benefit. One day in every week—the only day, indeed, on which these poorer people could visit him without loss, but the day on which most professional men seek some repose from work—was, during many of its hours, given up exclusively to them. Rough fathers tenderly carrying crippled children and women wheeling home-made perambulators of the strangest type could be seen in crowds at his house every Sunday the whole year through; and none of them went away without his attention. But this kind of work did not exhaust his sympathy for them. Strange old crippled men, youths with broken health, and such-like were again and again taken into his lathe room or into some other department of his busy establishment, and either retained there for years and treated with tenderness and affection or provided with places at his solicitation. One final circumstance which helped towards the great results which, in the short life of fifty-five years, he was able to achieve must be noticed. It is the peaceful and loving character of his inner home life. He had no family, but the unwearying and loyal devotion to a wife, who sympathized with him in all his undertakings and shared in his affection for the poor, and the love, almost amounting to veneration, of nephews and nieces and old and attached servants, made this inner home one of the most restful and beautiful places upon earth. It was impossible for anyone to know him intimately without being moved to admiration by the purity and unselfishness of his life, and even the little eccentricities that played over the surface of his character, and which some, who looked no further, thought to constitute it, were of the lovable kind, and served but to bind him more closely to the affection of his friends.

Memorial to H. O. Thomas

(B. M. J., July 26, 1919, 110)

It is very appropriate that the Liverpool Medical Institution should take the lead in founding a memorial to Hugh Owen Thomas, for he spent the whole of his working life in that city. Of no man can it be more truly said that time has justified his teachings and practice. The experience of the war has proved that the principles be laid down for the treatment of injuries and deformities of the limbs were sound and the appliances he devised the best. Professor Arthur Keith devoted to Thomas one lecture of the course he gave at the Royal College of Surgeons of England in the winter of 1917-18, on the anatomical and physiological principles underlying the treatment of injuries to muscles, bones, and joints. In it Professor Keith gave a short account of Thomas's laborious life, his theories, and practice. Thomas's realization that repair could be fostered only by the patient, personal application of the surgeon's head and hand day after day, week after week, month after month, if necessary, year after year was, he said, of even greater value than his discovery of the fuller meaning of the word "rest" and his genius in designing new means of giving rest. "No one who will take the trouble to ascertain what he did, and the circumstances under which he accomplished his life's work, will fail to see that he has earned himself a place among great British surgeons." In an interesting pamphlet relating Thomas's achievements, issued by the Liverpool Medical Institution in connection with its appeal for subscriptions to the proposed memorial, it is asserted, as we believe with truth, that the appliances he invented and finally perfected have not yet been improved upon; they were based on such clear fundamental principles that modern so-called improvements have, without excep-

tion, been retrograde. Thomas was much more than a skilful deviser of ingenious appliances. In joint disease his splint enabled sufferers to enjoy fresh air and exercise, so that he was a true pioneer of the fresh air treatment of tubercle. His observations on paralyzed muscles—that they are stretched by their opponents and that, to prevent this, position is of supreme importance—laid the foundation of the essential after-treatment of all motor nerve injuries. His treatment of delayed union of fractures by producing passive congestion—"damming the circulation"—anticipated the so-called "Bier's method" by many years, and his manipulative treatment of club-foot in infants was designated in error "Lorenz's bloodless surgery" twenty years later. His clinic became the resort of distinguished surgeons from all over the world; his ideas, in fact, at that time obtained more recognition abroad, especially in America, than in this country. He may truly be said to have been one of the fathers of orthopedic surgery and the founder of the Liverpool school. No greater compliment, as the pamphlet says, could have been paid to his memory, ideas, and principles of treatment, than the selection of his nephew, Sir Robert Jones, for the important position of Director of Orthopedic Surgery to the British army during the war. Thus has Thomas vicariously contributed to save many a wounded soldier from crippledom and done an immense service to the nation. The Liverpool Medical Institution has resolved to found an oration in that branch of surgery which Hugh Owen Thomas did so much to create, and if the memorial fund receives the financial support it deserves, to erect also a statue or bust. A committee has been formed in Liverpool with Mr. Thelwall Thomas (President of the Institution) as chairman, Mr. D. Douglas-Crawford as secretary. Subscriptions may be sent to Dr. C. Thurston Holland at the Medical Institution, and should be crossed "Hugh Owen Thomas Memorial Fund."

Chemistry of the Blood

(Concluded from page 269)

quadrupled. Hypothermia in uremia suggests the same association as found in suppurative coli-bacillosis of the urinary tract. Uremia is apt to develop of course. Apparently this infection was excluded. Another type of infection in which the symptoms are said to resemble those of the present patient is spirochetosis ictero-hemorrhagica. There was no reason to suspect this condition. Fatal acute uremia is of course almost always accompanied by anuria or at least oliguria; but in this case as stated there was plenty of urine excreted. The urinary urea during the last day of life was 12 gms. per 1000 and evidently the kidneys had lost their power of concentrating the solids.

The diagnosis, despite the absence of finds, was nephritis from unknown infection, occurring before the development of structural alterations in the kidneys. The uremia affected the digestive tract and cerebrum but not the respiration. The lumbar puntures seem to have been indecisive. They are not mentioned in summing up.

Conclusions

1.From the foregoing outlines of the subject of blood chemistry, it is obvious that biochemists and chemists have carried to the final degree of development the forms and the technique of tests available for determining the constituents of the blood with the least expense in time, energy, material and cost. Their work might be called the purely laboratory and technical side of the matter.

2. Likewise from this study it is apparent that urologists are not yet in unanimity as to what shall constitute the primary or basal tests and what the final or supplementary tests. Likewise there is a certain amount of divergence of opinion as to what substances shall be examined for in the incidental or casual patient possibly of the urological type and the special patient definitely of the urinary lesion group. From the foregoing statistics there is relative uniformity in perhaps two-thirds of the urological world. It remains therefore for the remaining third to so revise their procedures that everyone will understand substantially what is meant by the general term "blood chemistry" as it appears in a record.

3. From careful reading of the statistics given as to the attitude of the general practitioner and of the general surgeon, it is clear that the application of blood chemistry to their field is still in the creative period. Of course the sooner the general profession adopts the teachings of so important a branch as urology in a matter so indisputable as blood chemistry, the greater will be the service to humanity of the profession as a whole and of each such branch.

It is hoped that the outlines of the subject as covered in this paper may in a certain sense at least and perhaps in a great degree point the way toward accomplishing the main object at issue, as they are stated in the foregoing conclusions.

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45 West 9th St.

Gonorrhea

The acute stage of gonorrhea is materially lessened by the intramuscular injection, into the buttocks, of 1.0 cc. of a one per cent solution of manganese butyrate, on the first day of the discharge and of 1.5 cc. on the fifth day. Do not give more.—(*Dr. J. J. Abraham, London Lock Hosp.*)

Mentality and Anthropometrical Tests

(*Concluded from page 278*)

increases susceptibility to many pleasures not otherwise accessible.

In examining the figures for certain diseases, it will be noted that contrary to expectation, there is better physical development than in the cases of those with no disease. Thus, those with heart murmurs are superior to those with no disease in weight, lung capacity and height, and equal to them in strength. So those with scarlet fever excel those with no disease in weight, lung capacity and strength, but are inferior in height only.

The general explanation of the anomalous physical superiority of those with certain diseases, is that *orignally* they had a better physique, so that while affected by some disease, they in spite of this maintained enough of their superiority to still be in advance. This points to heredity as the underlying basis of resistence and susceptibility to disease.

The discords most frequent are specific infectious diseases 22 per cent, diseases of digestion 17 per cent, heart murmurs 15 per cent, and heredity diseases 14 per cent.

The diseases least frequent are typhoid fever 4 per cent, scarlet fever 5 per cent and nervous and constitutional diseases each 7 per cent.

100 East Capitol Street.

Pellagra

(*Concluded from page 279*)

tion, or shock, we employ a solution of epinephrin 1-1000 —one c.c. a day and if the kidney is crippled, we utilize liquor ferri et amonii acetatis in doses of from two drams to ½ ounce.

The prognosis is variable. The fulminating cases die in a few weeks. A rather striking feature is that a pellagrin may become almost moribund and still pass through the attack. It is easy to note therefore that the physician must be very guarded in making a prognosis.

Several thoughts stand out in the matter of treatment. In the first place there must be absolute rest in bed in a darkened room, and for cases affected mentally, solitude. The diet should be highly protein.

Malaria

(*Concluded from page 282*)

Dr. Ali Bey, a high official of the Turkish Red Crescent, in a report on the malarial problem in Anatolia says: "The malarial problem in Turkey is difficult, because the disease is so widespread and the financial resources of the country so limited. Malarial victims are found by the hundreds even in the remotest villages. I do not believe there is a single district which is not contaminated. Nothing important has been done to fight the disease. The few attempts to distribute quinine were without results. The resources of the government and the Red Crescent are too small to cope with the problem."

Similar conditions exist throughout the whole country. Dr. Marion C. Willson and Dr. Mabel E. Elliott, in charge of the Near East Relief Hospital in Marash, report: "The malarias are extremely malignant. Many cases are accompanied with spleens the lower edges of which reached to the crest of the ilium. In a number of cases, the abdomen is completely flat to percussion due to the enlarged spleen and liver. The routine treatment for cases of malaria admitted to the hospital is 7.5 grains of quinin, hypodermically into the muscle morning and afternoon for two days, then ten grains by mouth four times a day, according to temperature, but usually for three days, then five grains three times a day for several weeks if possible. In only a selected number of cases is the follow-up treatment given as there has never been a sufficient quantity of quinin to warrant it. The convalescent period is much shorter on a strictly liquid diet, as this eliminates to a large extent gastric symptoms. For weeks in the Fall, there are from 200 to 300 patients to whom intramuscular injections of quinin are administered."

Before the World War, although the anopheles was to be found everywhere in Asia Minor, there were not malaria infected people in all districts to infect the anopheles with the malarial plasmodium. However, after the war the demobilized soldiers returning from Yemen, Mosopotamia, Syria, and Macedonia brought every type of malarial pastmodium with them. The emigrants from Macedonia coming to Asia Minor as a result of the intermigration pact between Greece and Turkey have also greatly contributed to the diffusion of th disease.

Unfortunately, the exaggerated xenophobia of the Turkish Nationalists makes it very difficult for foreigners to help directly in the fight against malaria in Asia Minor. It will be necessary for them to work through some such organization as the Red Crescent. The Turkish Government is not very likely to permit any foreign society to build up and operate its own organization. The Red Crescent justly enjoys a high reputation throughout Turkey and has done a fine work with the limited funds at its disposal. Its medical and santary work with the emigrants from Macedonia has been capable and effective.

The fight against malaria in Asia Minor is really a fight for civilization. It should be directed by a sanitarian aided by engineers and agriculturists. The engineers alone cannot coquer the disease.

Syria and Palestine

Malaria is endemic throughout Syria and Palestine. All types of the disease are found. Studies of malaria in Jerusalem made by the Near East Relief showed that 53 per cent of all inhabitants under 5 years were infected, 30 per cent of those betwen 6 and 10 years, 30 per cent of those between 16 and 20 years, and 17.5 per cent of those over 21 years. Sixty per cent of the sufferers had the tropical type of malaria, 21 per cent the quartan, 16 per cent the tertian, and 3 per cent were mixed.

The malarial problem in Syria and Palestine presents a unique feature in that the principal breathing place of the anopheles mosquitos are the cisterns which are ubiquitious throughout these countries. The disease in the dry season (summer and fall) could be brought under control by an inspection force which saw to it that all defective cisterns were repaired and that all cisterns were kept completely covered. In winter and spring the abundant rains cause the formation of ponds and marshes in low places and often the temperature at this time of the year is sufficiently high to permit the anopheles to develop. Malarial epidemics among foreign troops quartered in these countries are not uncommon in December and January.

With France and Great Britain respectively holding the mandates for Syria and Palestine, it should be far easier to organize an efficient sanitary service to fight malaria than in Greece or Turkey. France and Great Britain have far greater resources in money and technical personnel than the two smaller nations.

The Near East Relief in connection with its orphanages operates clinics and hospitals in Beirut, Aleppo, Sidon, Jubeil and Jerusalem. A great deal of the work of these medical units has to do with the treatment of malaria among the massses of Armenian refugeees. The Near East Relief has thus been able to bring relief to thousands of individuals. However, this work by force of circumstances is largely palliative and cannot greatly change the general situation.

The Caucasus

Malaria in the Caucasus today is as serious a problem as in Macedonia and Asia Minor. The disease has been endemic here throughout history. Before the war, although there was no systematic fight against malaria, the population was educated to the use of quinin which could be bought in the grocery of every village. However, during the war the supply of quinin was cut off and this fact, supplemented by the continual going and coming of foreign troops, caused the disease to assume an epidemic character. At present in certain parts of Georgia ninety per cent of the population are infected. Georgia has a population of two and one-half million, and it is estimated that 800,000 suffer from the disease. Tiflis, the capital of Georgia, has 110,000 inhabitants, of whom 97,000 are malarial. Among these the mortality is five per cent annually. The number of sufferers in Armenia is estimated at 350,000, and in Azerjaijan at 800,000.

There are villages in Armenia and Georgia where no children under four years are to be found. Mothers realize that death awaits their children at the moment of birth. The worst months for the disease are August and September. Quinin is lacking everywhere in the Caucasus. In many places it can only be se-

cured at exorbitant prices. The sick are not treated. The governments of the various Caucasian states have not the resources to cope with the situation. In 1922 the governmnt of Armenia only distributed a total of 120 kilograms of quinin or five grains per individual of the population. This was equivalent to doing nothing at all. Conservative estimates are that forty per cent of the total population of the Caucasus suffer from malaria. In Georgia there is a central committee for directing the fight against malaria. This committee, although possessing an excelent staff of technical workers, is handicapped by the inadequacy of the funds at its disposal. It has, however, published scientific studies of the malarial problem in Georgia, distributed popular literature, and established a half dozen clinics throughout the country.

In Armenia, the Near East Relief have several hospitals and clinics. Great numbers of malarial victims are treated in these institutions. Through the Armenian government the Near East Relief has distributed ten tons of quinin in the last year and a half. In a number of districts where the Near East Relief is carrying on agricultural work, the improved irrigation and the bringing under cultivation of unused lands have reduced the number of anopheles and decreased the incidence of malaria in the population.

In conclusion, the importance of malarial study, investigation and campaigns in the Near East can be judged by the fact that today malaria is the greatest single destroyed of the human race in that part of the world, measured in terms of damage to health as well as direct mortality.

No single cause of premature death, of life-long misery, and of loss of working power has ever equalled malaria. It is the greatest single element creative of ill health in the history of the Near East.

Malaria every year destroys a population equal to that of the largest city in the Near East—say Constantinople or Cairo.

Although the number of deaths directly due to malaria is not as large as this figure would indicate, yet it is so extremely prevalent, so endemic in locality, and so persistent in the individual, that the total bulk of misery caused by it is quite incalculable. It is an accessory in at least half the deaths from disease which occur anywhere in the Neareastern countries, and it increases the death rate of these countries by at least 50 per cent as compared with non-malarial nations. It has profoundly modified the history of mankind in this part of the world by hampering the work of civilization.

Sennacherib and his Assyrians were destroyed by it; it had a large part in the decline of ancient Greece and Rome; to it is due the stagnant quality of the Chinese for centuries.

The progress which science has made in fighting malaria is one of the great accomplishments of the past century. For two thousands years not a step was recorded in the direction of preventing or curing the disease. Then came the discovery of quinin by a South American traveller who found that the Ecuador Indians cured their marsh fevers by chewing the bark of the cinchona tree. An English scientist made one of the first applications of the drug in curing Louis XIV of malaria. In 1820 two French savants separated from the bark its essential alkaloid, quinin.

The mosquito theory of malaria transmission is still more recent, having developed within the last generation.

The economic loss from malaria in the Near East would make a fascinating subject for statistical study. It is the opinion of a leading authority that the annual loss of time among the working classes amouns to at least 75,000,0000 working days per year, indicating a net economic loss of at least $75,000,0000 annually.

Parathyroid Therapy

The field for experimental parathyroid therapy is an enormous one. It includes:

1. Instances of supposed parathyroid deficiency or of partial parathyroid privation.
2. Cases of increased nervous excitability, whether in the domain of the nerve endings, the peripheral neurones, the spinal reflex arcs, or even the highest cortical processes.
3. Cases of true or supposed calcium deficiency.
4. Chronic toxemias.
5. Acute bacterial invasions.
6. Disease of other endocrine organs.—(*Practitioner.*)

Culture Mediums for the Gonococcus

The addition of levulose or maltose and the indicator bromcresol-purple to ascitic fluid agar gives a medium on which the gonococcus grows readily and can be distinguished easily from other associated organisms.

Positive cultures were grown from discharges in cases of chronic gonorrhea which had given a negative smear.—(*Jour. Inf. Dis.*)

The Physician's Library

Elements of Surface Anatomy. By I. Maclaren Thompson, M. B., Assistant Professor of Anatomy, McGill University. 164 pages, Edinburgh; E. & S. Livingstone, 1925.

This little book, written by a well known anatomist, describes very accurately the structures which enter into surface anatomy. In some instances he correlates the facts of surface anatomy with those of descriptive anatomy. The book is made up of five chapters, devoted to the head, neck, trunk, superior extremity, and inferior extremity. Those interested in anatomical study, this little treatise can be perused to real advantage.

A Manual of Gynecology. By John C. Hirst, M.D., Associate in Obstetrics, University of Pennsylvania. Second Edition, Revised. 508 pages with 195 illustrations. Philadelphia and and London: W. B. Saunders Company, 1925.

The excellence of this book caused the necessity of a new edition, and the author, therefore, took the opportunity of bringing it up-to-date and add much new material. Tests for sterility, the use of radium, new uses of diathermy, endocrine theraphy, backache, foreign protein injections, and technic of rectal and sigmoid examinations form some of the new material which appears in this edition. The book offers an excellent opportunity to review the subject.

Diseases of the Nose, Throat, and Ear. By William L. Ballenger, M. D.; revised by Howard C. Ballenger, M. D. 5th edition. 1,080 pages, 583 illustrations. Philadelphia and New York: Lea & Febiger, 1925.

It seems hardly necessary to make any extensive review of a text book which has already gone through four editions, and which is so widely known by physicians interested in this branch of medicine. The reviser has been careful to make as few changes as possible in the text of the original author, although he has added a considerable amount of new material. Indeed, he says frankly that the important feature of this edition is the anatomical and pathological matter which has been added.

The chapter on hay fever, hyperesthetic rhinitis, asthma, Ménière's symptom-complex, Whittmaack's theory of non-pneumatization of the mastoid, and other matters have been re-written or revised so as to conform with the latest thought of the day. Everything has been done to present a volume of unequalled excellence. Not only is the book splendidly printed, in accordance with the policy of the public here but the illustrations are of a very high order.

Bacteria in Relation to Man by Jean Broadhurst, Ph.D., of Teachers College, Columbia University. 306 pages, 147 illustrations. Philadelphia and London: J. B. Lippincott Company, 1925.

This is one of the series of nursing manuals which, although prepared for nurses, give an unusual amount of valuable information for physicians. Most of us have been practising long enough to forget altogether too much about microbiology. If we will read this very interesting and popularly written book, our former information will be doubly fixed in mind, and we will know, at the same time, what is new in this field of activity.

Why We Are What We Are. By Dale M. King, M.D., of Grace Hospital, Detroit, Michigan. New York: The International Journal of Surgery Co., 1925.

Doctor King, who is one of Detroit's best known neurologists, dips into the field of relationship, analyzes the ego, and shows how to apply psychotherapy, diet, hydrotherapy, and exercise to the different periods of life. His object is that we may approach health and happiness, and in finding them cling to them.

While one would say at the outset that the author had taken on a large contract he has really developed a very human kind of book, and one which every one might read to his own good advantage. He measures President Coolidge psychologically and queries as to whether or not we are returning to the primitive.

The book is exceptionally interesting, the laws it lays down for proper living can be easily carried out, and the conclusions reached are sound.

Symptoms of Visceral Disease. By Francis Marion Pottenger, M. D., F. A. C. P., Medical Director, Pottenger Sanatorium. Third Edition. 394 pages, 96 illustrations. St. Louis: C. V. Mosby Co., 1925.

The review of the previous edition to this book stands, and can be added to, because the author has given us more of the very excellent material which characterizes that in his other edition. As new knowledge is revealed in this particular field, the author brings it out in the book. The work will stand as a very important one in this interesting field.

American Illustrated Medical Dictionary (Dorland). A new and complete Dictionary of terms used in Medicine, Surgery, Dentistry, Pharmacy, Chemistry, Veterinary Science, Nursing, Biology, and kindred branches; with the Pronunciation, Derivation, and Definition. Thirteenth Edition, Revised and Enlarged. Edited by W. A. Newman Dorland, M.D. 1,344 pages with 338 illustrations, 141 in colors. Containing over 2,500 new words. Philadelphia and London: W. B. Saunders Company, 1925.

It is like meeting a friend from home to pick up another edition of this work. There are dictionaries and dictionaries, but Dorland stands at the head. In clarity and lucidity the definitions leave little to be desired, and it will be hard work, indeed, for any other book of similar nature to displace it. The present edition contains over 2,500 new words with modifications of many of the older definitions. Bound as it is in limp cloth, and with a great amount of collateral information within its pages, the volume leaves little to be desired.

Diseases of the Ear, Nose, and Throat. By Harold Hays, M. A., M. D., F.A.C.S. 961 pages with 495 half-tone and line engravings, and 55 full page plates. Philadelphia: F. A. Davis Company, 1925.

Despite the fact that there are many books on this subject, Doctor Hays, one of our best known specialists, has produced a work which is bound to attract wide-spread attention. He, like all far seeing authors, has made his appeal to the practitioner, rather than to the specialist. He realizes that the specialist has ideas of his own, but that the general medical man must depend on special text books for his special enlightenment. The author has carried out this idea to a nicety, with the result that the intelligent medical man should have no difficulty in perfecting his knowledge in the diseases described by a close application to the text, and an inspection of the very excellent illustrations with which the book is adorned.

It would be useless to attempt to pick out particular phases of his work for discussion. The reader may be assured that Doctor Hays has presented his subject in a very definite way, and one which cannot but be understood and appreciated by "him who runs."

Empyema Thoracis. By Evarts A. Graham, A. B., M. D., Professor of Surgery, Washington University School of Medicine. 110 pages. St. Louis: The C. V. Mosby Company, 1925.

The contents of this book form an essay which was awarded the Samuel D. Gross Prize of the Philadelphia Academy of Surgery in 1920. This little book presents some of the fundamental considerations in the treatment of empyema thoracis, and is discussed under the headings of pathology, prevention of chronic empyema, careful attention to the patient's nutrition and a discussion on the subject. To surgeons it will prove of very great interest and value, and as a contribution to surgical literature it is a master-piece.

Preventive Medicine. By Mark F. Boyd, M.D., C.P.H., formerly Professor of Bacteriology and Preventive Medicine, University of Texas. Second Edition, Revised. 429 pages with 135 illustrations. Philadelphia and London: W. B. Saunders Company, 1925.

Students of preventive medicine and workers in the field of hygiene will be interested in this treatise. It is devoted to diseases due to invading micro-organisms; deficiency diseases; occupational diseases; special aspects of hygiene and sanitation; demography; and public health. The author, who is now a member of the Field Staff of the International Health Board, has discussed the subject matter in detail, and he has added to the value of his work by employing some very excellent half-tone photographs.

Correspondence

Story Writers, Take Notice

To the Editor of the MEDICAL TIMES:

I am interested in compiling a collection of short stories written by doctors. As many of these stories are published under assumed names, or the medical degree of the author has been omitted, it is difficult to locate them. I am, therefore, writing, to ask that if you or your readers know of any short stories published by medical men you will kindly communicate the fact to me.

Harold Hays, M.D.,
22 West 74th St., New York.

Public Health

The Prevalence of Cancer

The collection of statistical information concerning the prevalence of cancer is one of the two principal objects of the American Society for the Control of Cancer. In view of this fact and of the many uses to which statistical data as to the mortality from cancer may be put in the educational campaign which the Society is leading, the following information is of much value.

Sources of the Data

In considering these figures it will be well to remember that they represent official death rates as compiled by the Bureau of the Census from copies of the original death certificates and supplied by the several states in which the deaths occurred, and estimates of population based on the preceding census, due allowance being taken into consideration for the increase since the last enumeration was made.

A death rate is really the number if recorded deaths which have occurred during the year compared with the population on a certain day of that year and is usually expressed as so many deaths per 100,000 of population if for a particular disease, or so many per 1,000 if all causes of death are included.

Not all the States of the Union as yet collect death certificates with sufficient accuracy to warrant the Census Bureau in using them, but the number is constantly increasing and it will not be long before the whole of the continental part of the United States will be included. The part for which vital statistics are available is called the Registration Area. In 1923 this comprised 87.6 per cent. of the total population of this country located in North America.

The Total Number of Cases

Cancer is nowhere a reportable disease in the United States and the prevalence of cancer can only be estimated from the death returns. This is hardly a satisfactory method of arriving at it, inasmuch as the duration of the disease varies considerably, being taken by some authorities to average two years and by others three years before death occurs. When an illness of such long duration it is obvious that many persons who have cancer, and woud assuredly die of it in time, must die of other and more immediately fatal diseases, as pneumonia, for example, and so escape being recorded as dying of cancer. This tends to make the cancer death rate lower than it otherwise would be and causes the prevalence of cancer to appear less than it really is. Again, the cases which are cured cannot be taken into account and this produces a like effect.

There is a factor which is more potent than all others put together in tending to make the prevalence of cancer seem less than it actually is, and this is the incompleteness of the original returns. More people die of cancer than are so recorded, the reasons for their omission from the records being many. Chief among them is the fact that many cases ae not correctly diagnosed, even when they end fatally. In hospitals where autopsies are regularly performed this error has been found to be as high as thirty per cent. If the death rate is too low the pevalence which is based upon that rate must be too low also. All things considered, and in the absence of better figures, it appears not an exaggeration to assume that the number of cases of cancer which exist at any place at any time is about three times the number of deaths which occur there in the course of a year. This means that in that part of the United States which is situated on the North American continent fully 300,000 people are suffering from cancer at the present time.

Cancer Compared with Other Causes of Death

Cancer is one of the most frequent causes of death according to the vital statistics issued by the Census Bureau. This is shown by the following table of the six leading causes of death in 1923, the latest year for which figures are available.

TABLE I

LEADING CAUSES OF DEATH

United States Registration Area, 1923

Causes of Death	Rate per 100,000
Heart Disease	175.3
Pneumonia	109.0
Tuberculosis	93.6
Cerebral Hemorrhage and Softening of the Brain	90.4
Nephritis	90.1
Cancer	89.4

In the foregoing table cancer stands sixth in the order of the most frequent causes of death; but as a disease of adult life which is independent of any other disease it stands not only

first, but alone. Heart disease is usually the result of some other disease or condition. Pneumonia is often a terminal infection superimposed upon another disease. Tuberculosis causes fewer deaths among grown people than does cancer. The diseases grouped under "nephritis, cerebral hemorrhage and softening of the brain" are, to a considerable extent, due to preceding infections.

The Increase in the Official Death Rates

The official death rate for cancer has long been increasing. In twenty-three years it has mounted from 63.0 to 89.4. The rate each year may be seen in the following table:

TABLE II

INCREASE IN THE CANCER DEATH RATE

United States Registration Area

Year	Rate	Year	Rate
1900	63.0	1912	77.0
1901	64.3	1913	78.9
1902	65.1	1914	79.4
1903	68.3	1915	81.1
1904	70.2	1916	81.8
1905	71.4	1917	81.6
1906	69.1	1918	79.7
1907	70.9	1919	80.5
1908	71.5	1920	83.4
1909	73.8	1921	86.0
1910	76.2	1922	86.8
1911	74.3	1923	89.4

The foregoing table shows that the rate has increased with remarkable consistency. The total increase from 1900 to 1923 was 26.4 or 41.9 per cent. and from 1919 to 1923 it was 8.9 or 11 per cent.

As will appear in Table IV the total number of recorded deaths from cancer in the Registration Area in 1923 was 86,754. If the rest of the United States (continental) had as many deaths from cancer in proportion to the population as did the Registration Area, the total cancer deaths in the entire country (continental), in 1923 would have been 99,000. This may be compared with 95 000 for 1922.

Where the Cancers Occur

Table III shows in what parts of the body these cancers were situated.

TABLE III

CANCER DEATH RATES FOR VARIOUS ORGANS

United States Registration Area

Site of Cancer	1900	1910	1923
All organs	63.0	76.2	89.4
Buccal cavity	1.6	2.9	3.1
Stomach and liver	22.5	30.6	34.1
Peritoneum, intestines and rectum	5.7	9.8	12.3
Female genital organs	8.8	11.4	12.6
Breast	4.7	6.9	7.9
Skin	2.0	2.7	2.7
Other organs and organs not specified	17.8	11.9	16.7

Table III shows that the stomach and liver was by far the most frequent site of fatal cancer in each of the three years recorded. The least frequent site was the skin. Increases in the rate occurred for all locations, the most pronounced being for the peritoneum, intestines and rectum—a fact due in part, no doubt, to the employment of better methods of diagnosis which resulted in more and more cases being reported as cancer which is earlier times would have been mistaken for some other difficulty.

Distribution Between the Sexes

The way in which the deaths were divided between the two sexes and with reference to the sites of the diseases is shown in Table IV.

TABLE IV

NUMBER AND PER CENT OF CANCER DEATHS FOR VARIOUS ORGANS ACCORDING TO SEX

United States Registration Area, 1923

A

Seat of Cancer	Number of Deaths		
	Total	Male	Female
All organs	86,754	37,990	48,764
Buccal cavity	2,992	2,479	513
Stomach and liver	33,080	17 881	15,199
Peritoneum, intestines and rectum	11,951	5,281	6,670
Female genital organs	12,264	.....	12,264
Breast	7,704	111	7,593
Skin	2,618	1,612	1,006
Other organs and organs not specified	16,145	10,626	5,519

Joan of Arc

This beautiful statue of the Maid of Orleans was presented to the City of Portland, Ore., by Henry Waldo Coe, M.D., editor of the *Medical Sentinel*, and one of America's best known physicians.

B

Seat of Cancer	Total	Per Cent. Male	Female
All organs	100.00	43.79	56.21
Buccal cavity	3.45	2.86	.59
Stomach and liver	38.13	20.61	17.52
Peritoneum, intestines and rectum	13.78	6.09	7.69
Female genital organs	14.14	.....	14.14
Breast	8.88	.13	8.75
Skin	3.02	1.86	1.16
Other organs and organs not specified	18.60	12.24	6.36

Table IV shows that cancer was much more frequently a cause of death among women than among men and for the reason that the breast and female genital organs are often the site of cancers. When allowance is made for cancer in these locations the disease is seen to have been far more prevalent among men than among women. Cancer seldom occurred in the buccal cavity among women, nor was cancer of the skin or of the stomach and liver so common among them as among men.

It is curious to observe that cancer in what is called "other organs and organs not specified" was nearly twice as common among men as among women, indicating that the diagnosis was more frequently made with more definiteness among women than among men.

The Table shows that for men cancer is particularly a disease of some part of the digestive tract. For women this is scarcely less so, although to this susceptibility women and a notable liability to cancer of those organs which mark their sex. Nothing is more remarkable about Table IV than its testimony that men have almost five times as much cancer of the mouth as do women.